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Exploring the Social Link between Cerebral and Cerebellar Neural Ensembles through a Falsifiable Psychological Heuristics

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Abstract

This article employs the logos psychological heuristics in proposing that the organization of the universe, subatomic ensembles, and the humane brain sustains the journey of the Mesoamerican demigod Quetzalcoatl: In the quantum hyperspace that the second attention hides in our 5000 cerebellar microcomplexes, A) quantum coherence helps the going "coatl-quetzal" join the legitimacy of the autistic "coatl-serpent," guarded by the first attention in the classical spacetime of about 2 000 000 cortical columns, to the illegitimacy of the schizophrenic "quetzal-bird" lodged in the cerebellar cortex, and B) quantum decoherence helps "quetzal-coatl" return from schizophrenia to autism with a new piece of knowledge. The social link that harmonizes the first with the second attention, spacetime with hyperspace, and classical with quantum computing makes the return of Quetzalcoatl and the Third Attention. In cerebellar microcomplexes, the Third Attention ties the certainty conveyed by mossy fibers from the cerebrum to doubt in the long-term potentiation spread by parallel fibers; the coherence-divergence of long-term potentiation, to the decoherence-convergence of long-term depression in the Purkinje cells that grasp a pun; and the excitement of chosen Purkinje cells in nonlocal hyperspace, to the inhibition of the deep nuclei that induce laughing in local spacetime.

Keywords: autism, classical computing, cortical columns, locality, nonlocality, quantum computing, cerebellar microcomplexes, cerebellar long-term potentiation, schizophrenia, cerebellar long-term depression, humor, progress

1. Overall Perspective

At the turn of the 20th century, my master's research (Cassella, 1997) and my doctoral thesis (Cassella, 2000) allowed me to develop the rudiments of the logos psychological heuristics about the quantum second attention and neural hyperspace impaired in autism and the classical first attention and mental spacetime spared in high-functioning autistics. My initial research and my subsequent enhancements of logos in the first decade of the 21st century (Cassella, 2002, 2008) have been consolidated in an ad hoc article (Cassella, 2011).

In examining the psychological roots of the autistic and of the exploring facets of the human brain, I relied on the help of the Boston Higashi School and of the following researchers: Baron-Cohen, Leslie, and Frith (1985); Bauman and Kemper (1994, 2006); Caramazza (1994); Cappelletti (1969, 1972); Castaneda (1968, 1972, 1987, 1991); Cieselski et al. (1995); Courchesne et al. (1994); Feynman (1985); Gergely (1994); Guth (1997); Happ è (1994); Harris (1993); Hooks (in Cassella, 1997); Ito (1993); Johnson (1994, 1995); Kagan (1981); Kanner (1943); Kolb and Whinshaw (1996); Lainer, Lainer, and Dow (1989); Lakoff (1987); Landry and Bryson (2004); Luft (1969); Mundy (1995), Ozonoff, Pennington, and Rogers (1991); Padrón 1996), Perner (1991); Piaget (1983); Pinker (1994, 1997); Povinelli, Landau, and Perilloux (1996); Ricoeur (1991); Rimland (1964); Schmahmann (1994); Sears, Finn, and Steinmetz (1994); Tager-Flusberg (1994); Watson (1994); and Zaitchik (1990).

Logos began with the discovery of two principles of quantum computing, hyperspace, or the second attention wronged in autism: Ubiquity, i.e., *Anything can be in two or more places simultaneously*; and Coincidence, i.e., *Two or more objects can share the same space at the same time*. Subsequently, I added two principles of classical computing, spacetime, or the first attention spared in autism: Locality, i.e., *No one can be in two or more places simultaneously*; and Impenetrability, i.e., *Two or more objects cannot share the same space at the same time*.

The contradiction that separates the second from the first attention, hyperspace from spacetime, flexibility from rigidity, renovation from conservation, and quantum from classical computing was dampened by realizing that their failure to

fathom the infinite speed of quantum wittiness stands behind the cognitive destitution of autistics. Beyond Karl Marx's materialism, the veil around the mind-body problem and autism is lifted by any individual smiling at a gracious pun. The union between the principles of classical computing and the principles of quantum computing occurs, for example, in the person whose body smiles in a unique place and time, after perceiving subtle humor through the infinite mental speed that touches separate stories simultaneously.

During the second decade of the 21st century, my renewed research on the alliance of classical spacetime in the first attention and quantum hyperspace in the second attention (Cassella 2013a, 2013b, 2017a, 2017c, 2017g, 2017h, 2018) also rested on the help of others: Alter (1996); Al Shaykh (2011); Andrew (1999); Anonymous (2003); Bostan and Strick (2010); Brown (1970); Burroughs (1990); Cooper (2003); Copplestone (1962a, 1962b); Cottrell (1992); Dodell-Feder et al. (2011); Fonterotta (1998); Gore (2013); Icke (1995); IPCC (2014); Ito (2011); Köestler (1964); Kump et al. (2005); Lao Tze (1891); Larrosa (1996); Loyd (2006); Matt (1997); Mormon (1830-1981); Neumann (1991); Nietzsche (1968); Pagels (1996); Penrose (2007); Redondi (1987); Riordan, Tonelli, and Wu (2013); Safina (1998); Sieroszewsky (1950); Theodore de Bary (1972); Toynbee (1989); Villalba (1989); Ward (2006); Worland (2016a, 2016b); Yenne and Garrat (1994); Yoshikawa (1995); Youn-Koen (1984); and Zalasiewicz (2016).

This article combines my twenty-year exploration of the first attention spared in high-functioning autistics, the second attention impaired in autism spectrum disorder (ASD), and their alliance in the Third Attention that recreates the universe, subatomic ensembles, and the social brain. The African and Neanderthal troglodytes that dream in our genes mastered during more than 200 000 years the Third Attention, which harmonized their lives with the lives of their nonhuman travel companions. In the last 200 years, the tenfold growth of world population and per-capita energy consumption compelled us to replace one half of nonhuman free species with one billion motor vehicles, weakening our awareness of the Third Attention. However, loving autistics will help us regain the splendor of the Third Attention. The Third Attention will allow us to avoid the devastation linked to global warming, terrorism, and the use of weapons of mass destruction, while trailing Sammy Fain and Paul Webster in dreaming that "Love Is a Many-Splendored Thing."

About 40 000 years ago, at least three reasons made cave dwellers aware (Cassella, 2016) of the roots of reciprocal development, hidden in any natural system:

a) our spontaneous laughing at a pun;
b) our enjoyment at the living harmonies hidden in the plucking of a tensed string; and
c) our capacity for transferring the tension generated by quantum infinity in the simultaneous union and separation of the two arms of a bow onto the quantum nothingness that surrounds the head of an arrow.

Laughing after getting a joke, playing a musical instrument, and releasing an arrow into a magical deer, whose death fed the dreams of our ancestors, rely on the same cognitive alliance. This article explores the mystical, mythical, philosophical, social, anthropological, psychological, scientific, and neural roots of a falsifiable heuristics (logos) about the union of the first with the second attention, classical with quantum computing, need with chance, spacetime with hyperspace, and finiteness with infinity in the renewal brought by the Third Attention (Cassella, 2017a, 2017b, 2017d, 2017e, 2017f).

2. Method

At the turn of the 20th century, my research effort was focused on examining: a) the classical capacity of 18 teens for following the perfect order sought by the autistic facet of normal human beings and b) their capacity for making less-than-perfect decisions, impaired in autistic children before the age of three years. The background section illustrates the psychological roots of the logos heuristics consolidated in the dissemination (Cassella, 2011) of my initial experimental results (Cassella, 1997, 2000) and an allied research effort (Cassella, 2002, 2008).

The discussion section illustrates my use of logos, in the second decade of the 21st century, to explore the roots of the universe, the subatomic world, Sacred Texts, language, works of art, and sociality. I also emphasize there a hypothetical view of the neural layout of the hopeful going and of the exhilarating return of the Mesoamerican demigod Quetzalcoatl in the humane brain. The readers that link the hope of the "going coherence-journey" of Quetzalcoatl with the exhilaration of his "returning decoherence-journey" need not fear the technical terms that relate classical to quantum computing in the growth of intelligence in natural systems.

3. Background

3.1 The Pioneering Research of Jean Piaget in Relation to the Growth of Classical Computing in Infancy

Figure 1 summarizes my interpretation of the main findings[1] of Jean Piaget on the early growth of human intelligence:

[1]The development that Piaget linked to the first seven-and-a-half years is linked now to the first six-and-a-half years.

1. During the first four months of life, newborns develop self-awareness through the *perfect repetition* of the movements of their limbs, head, and torso.
2. Afterwards, the toddler learns how to incorporate a perceivable object in her sphere of *perfect control* (e.g., by hitting her cradle).
3. At one year of age, the child becomes aware of the *invariant union between two perceptions*, as in hitting a drum with a stick.
4. By the age of two years, a little girl (or boy) joins a perception to a *shared representation*; for example, searching for a stick away upon seeing a drum. One half of four-and-a-half-year-old chimps raised in captivity may also exhibit this cognitive achievement (Povinelli, 1996), which includes the *concept* of the self in the present (Gergely, 1994).
5. In the fifth stage (before age seven-and-one-half years in Piaget's terms), a child acquires the ability to link two or more concepts within *shared meta-representation*. All that allows preschoolers to connect different experiences of an invariant self (Proper Self) (Povinelli et al., 1996), or of an invariant other (Zaitchik, 1990).

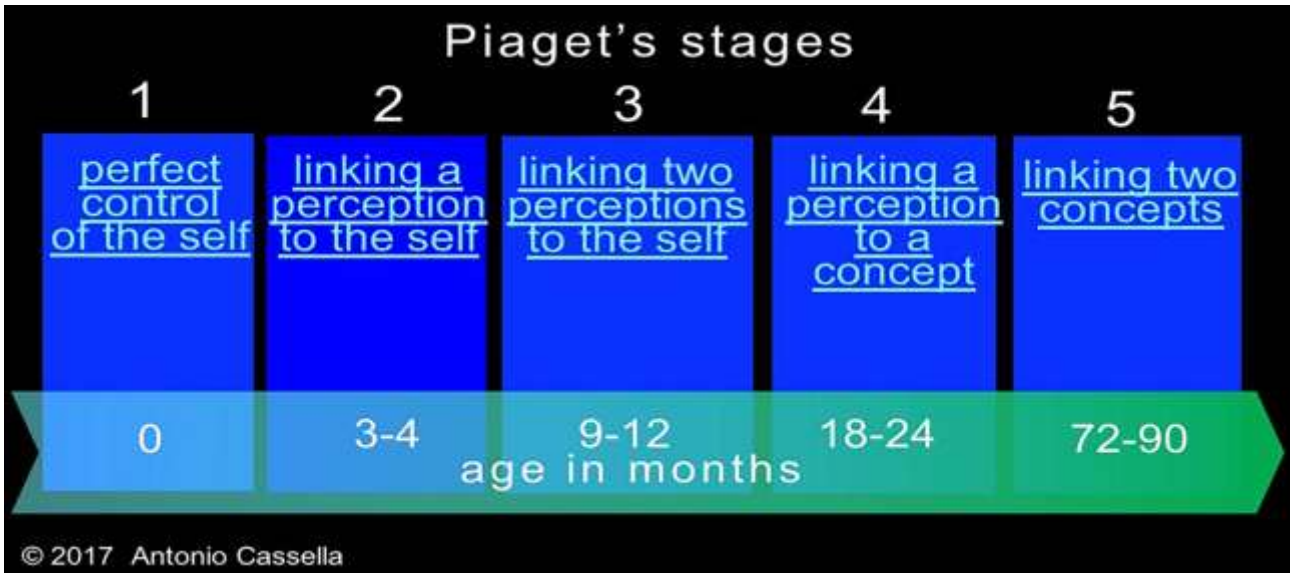

Figure 1. Piaget's view of the growth of the classical capacity for information processing in childhood

At this point, I need to stress the fact that nonhuman animals cannot follow the capacity of preschoolers for classical or quantum meta-representation. I am not aware of research about proving or disproving the ability of nonhuman animals to combine classical and quantum neural computing below the capacity for meta-representation; for example, in the proto-declarative pointing produced through joint attention in one-year-old, nonautistic children (Baron-Cohen, 1995).

3.2 The Lack of Quantum Information Processing in the Autistic Spectrum

Because none of Piaget's experimental subjects was autistic, that researcher measured only the growth of the primary capacity for *perfect*, *local*, or *classical information processing* within our *explicit self* (the upper blue stages in Figure 2). Piaget never detected that a secondary, less-than-perfect, nonlocal, or quantum mode of information processing enlivens the *implicit self* harmed in autism (the lower red stages in Figure 2). Although he matched reversible reasoning to creative intelligence (Piaget, 1983), Piaget never realized that exchanging a cause with its effect belongs to quantum computing and the second attention.

The separation between the classical and the quantum vector of information processing in human development is found only by comparing the performance of autistic subjects in neuropsychological tests to the performance of nonautistic controls with the same mental age (Cassella, 1997, 2000, 2002, 2008, 2011). Nonautistic subjects *will pass* both,

A) classical tests driven by information that agrees with the reality detected by the first attention (in the upper part of Figure 2) and
B) quantum tests passed by empowering the second attention in choosing beliefs that contradict reality (in the lower part of Figure 2).

By contrast, autistic subjects *will not pass* tests connected to the second attention in which they have to follow a belief that challenges the truths guarded by the first attention.

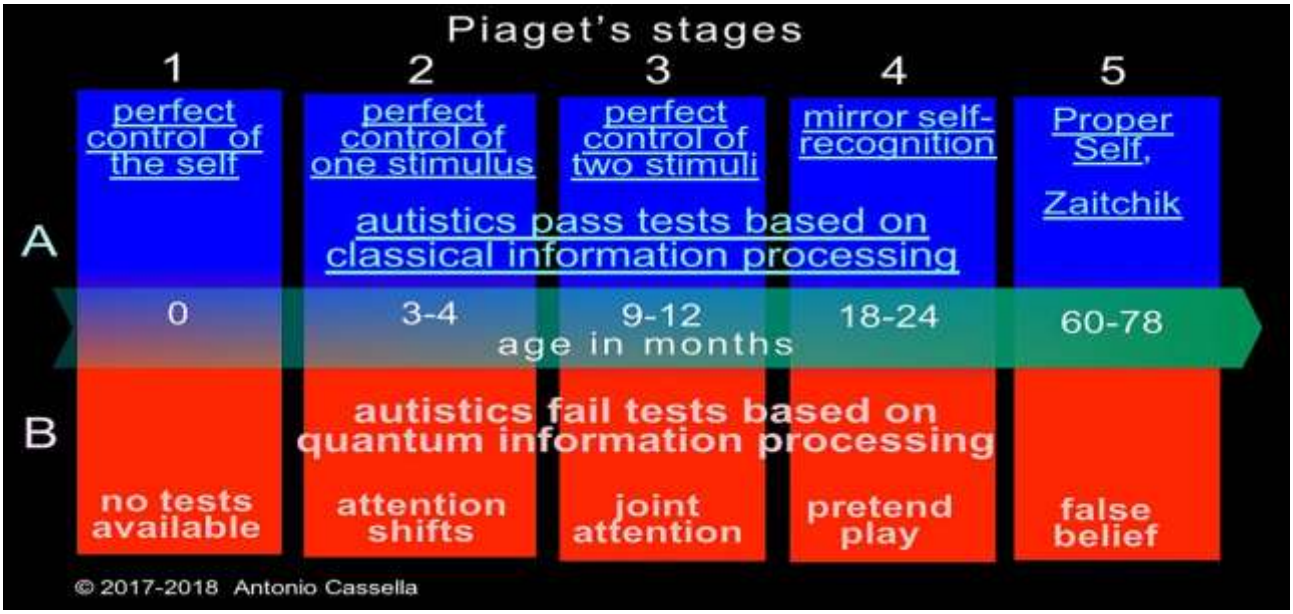

Figure 2. Growth of classical and quantum information processing in human development

3.3 The Reality of the Growth of Quantum Information Processing in Infancy

In more detail, my research about the psychological underpinnings of autism led me to concluding (Cassella, 1997, 2000, 2002) that seven-year-old nonretarded autistic subjects *will pass any test rooted in classical computing and unequivocal reality* (A, in the upper part of Figure 2); for example, . . .

- Mirror-Self-Recognition (Gergely, 1994), or the recognition of the self in the present attached to Piaget's fourth stage;
- Proper Self, or the recognition of the self in the past in Piaget's fifth stage (Povinelli et al., 1996); and
- Zaitchik (1990), or the recognition of the other in the past.

I also corroborated the hypothesis that high-functioning autistics *will fail tests that involve quantum computing and the processing of ambiguous information* (B, in the lower part of Figure 2); for example, . . .

- attention shifts (Johnson, 1994, 1995),
- joint attention (Butterworth and Jarrett, 1991),
- pretend play (Gergely, 1994), and
- false belief (Baron-Cohen, Leslie, and Frith, 1985; Baron-Cohen, 1993; Baron-Cohen, 1995).

An update of the 300 questions on autism, global warming, and progress that I answered in a remote haven of the Venezuelan Andes during the evenings of Halloween, All Saints, and the Day of the Dead in 2013 (Cassella, 2017a), reports in more detail the aforementioned tests and my research on the alliance of unequivocal with ambiguous information processing.

3.4 The Rise of Classical Spacetime and Quantum Hyperspace

My hypothesis about the failure of autistics to sublimate quantum doubt in solving a new problem follows my support of the conclusion that autistic children surpass normal adults in eye-blink conditioning (EBC) (Sears et al, 1994); also, that autistic adults will fail attention-shifting protocols (Courchesne et al., 1994) passed by normal four-month-olds (Johnson, 1994, 1995).

In the spring of 1996, I found that Perner (1991) had confirmed that nonretarded autistics underperformed normal controls in false belief and outperformed them in Zaitchik Photo Task. At the same time, Daniel Povinelli sent me the details of his Proper-Self protocol (Povinelli, Landau, and Perilloux, 1996). In the summer of 1996, all nonretarded autistics in the sample that I examined on the grounds of the Boston Higashi School *passed* Proper Self and *failed* false belief. By contrast, the two geniuses I examined *passed both* Proper Self and false belief. Upon hearing of the results of my experiment, Alfonso Caramazza, head of the Psychology Lab at Harvard University, suggested that *Proper Self* (and Zaitchik) *represents a necessary but insufficient condition to pass false belief*. He implied that nonautistics choose a false over a true belief through a bizarre domain of cognition that he had called *hyperspace* (Caramazza, 1994).

Caramazza's observation about quantum hyperspace strengthened my hypothesis that the autistic facet of the normal

mind keeps alive illusory invariance in the cognitive dimension I called *spacetime* (Cassella, 2000).

3.5 The Alliance of Spacetime and Hyperspace in the Social Mind

In the summer of 1997 Bernard Rimland, from the Board of Directors of the Boston Higashi School, told me that autism and schizophrenia are opposite facets of the same cognitive dimension (Rimland, 1964). This led me to ascribing (Cassella, 1997, 2000, 2002) . . .

1. the common spacetime cherished by autistics and the uncommon spacetime sought by schizophrenics, to the rigor of "yes against no" in the local computing that animates the first attention; and
2. hyperspace in pretending two-year-olds, to the flexible embrace of "yes and no" in the nonlocal computing that sustains the second attention impaired in autism and schizophrenia.

I hypothesized later (Cassella, 2008, 2011, 2013a, 2013b) that the organization of the social mind (Figure 3) represents a universal feature of information processing. As with the Mesoamerican demigod "Quetzalcoatl" ("bird-serpent," or "feathered serpent"), normal persons may . . .

- leave behind the perfect *coatl-serpent* of local reality (phase 1 in blue and the left lower part of Figure 3) (p = *probability of existence* or *legitimacy = 1*);
- approach the edge of schizophrenia by leaning on the less-than-perfect coherence ($|1\rangle$ *and* $|0\rangle$) (ket one and ket zero) in the second attention and the going journey of Quetzalcoatl (phase 2 in red and the central part of Figure 3);
- steal a new scheme from the crazy *quetzal-bird* that inhabits the unknowable (-1, with $p = 0$); and
- return (phase 3 in green) to an enriched serpent-coatl through quantum decoherence and the Third Attention.

In readjusting our interpretations of visible reality, the Third Attention reflects the alliance (3) of classical locality (1) in the first attention (followed by the explicit self who is either autistic or schizophrenic) with quantum nonlocality (2) in the second attention (followed by the implicit self who courts simultaneously autism and schizophrenia).

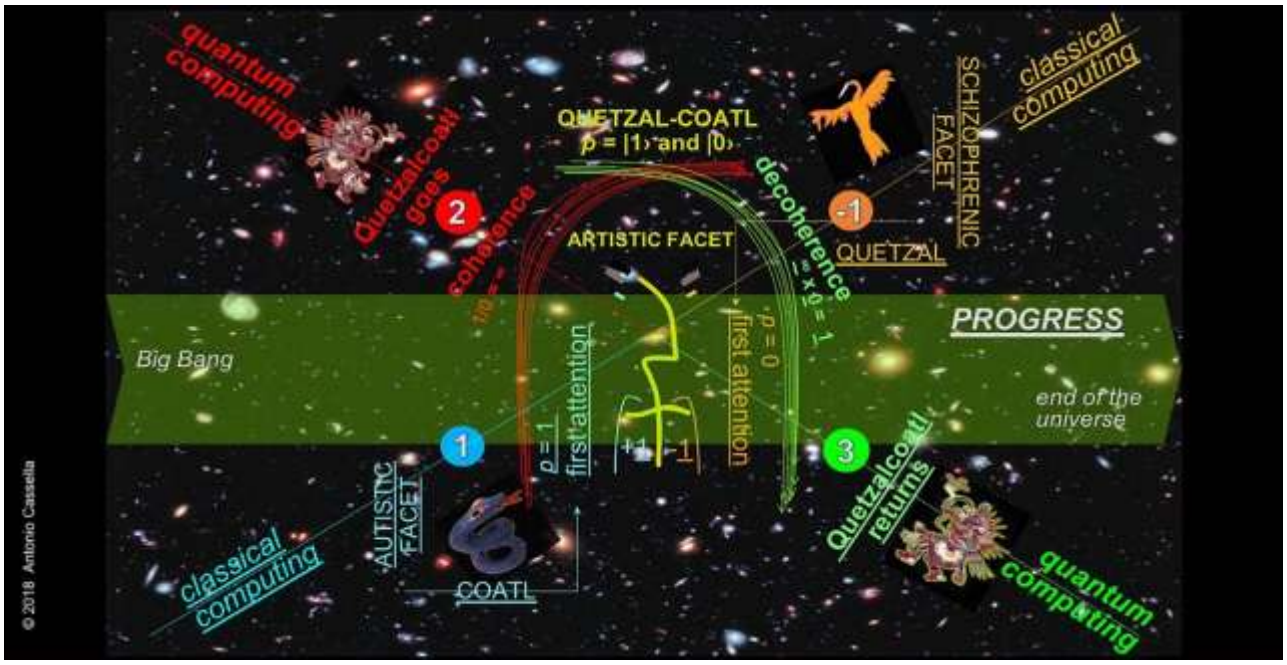

Figure 3. Quetzalcoatl as the artistic facet (center) that swings, through coherence and decoherence, between an autistic (lower left) and a schizophrenic (upper right) facet (Picture of the visible universe by NASA, ☺)

3.6 The Psychological Relationship between Local and Nonlocal Computing

In 2004, I took into account the "shift/disengage" protocol (SDP) by Landry and Bryson (2004): Autistics matched normal subjects in shifting their local first attention from a group of flashing lights that went off on one side and went on on the opposite side in the "shift" stage. However, autistic subjects *did not* engage their nonlocal second attention during the "disengage" stage, when the lights went on on the opposite wall while the original lights remained on. The nonlocal capacity of nonautistic subjects for looking simultaneously *in their minds* at opposite sets of lights in the SDP protocol can be compared to *seeing at the same time* the left face and the right face of a medal (Figure 4), a feat that calls for an *infinite speed*.

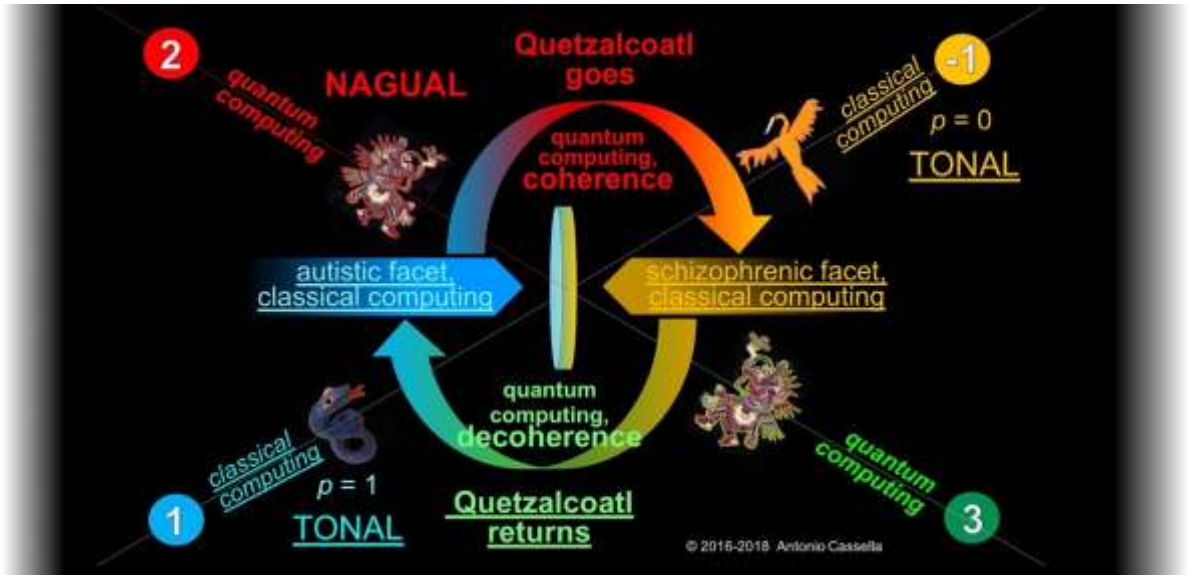

Figure 4. Going and returning in nonlocal quantum computing

After studying the SDP protocol, I surmised that the implicit self harmed in autism can go (2) and return (3) between an autistic (1) and a schizophrenic (-1) facet—and between any pair of opposite lights, or tenets. Hypothetically, the going movement of the second attention from autism to schizophrenia can be assigned to quantum coherence (the left-higher part of Figure 3 and the upper part of Figure 4). By contrast, the return of our Third Attention (3) from schizophrenia (-1) to autism (1) can be credited to quantum decoherence (the right-lower part of Figure 3 and the lower part of Figure 4).

Terrestrial autistics and brainwashed subjects (represented by the snake, or the Nahuatl "coatl") cannot enter the quantum coherence (the red hair in the left part of Figure 3 and the upper arrow of Figure 4) that allows normal persons to approach their floating schizophrenic facet. And unmedicated schizophrenics (represented by the bird, or the Nahuatl "quetzal") lack quantum decoherence (the green hair in the right part of Figure 3 and the lower arrow in Figure 4). For different reasons, both autistics and schizophrenics lack malice. In following the rigid ways to power of the first attention, also ancient Aztecs left quantum malice behind.

3.7 Nature and the Mind in Mesoamerican Mysticism

In the 13th century CE (Common Era), a group of Mexica mercenaries entered the valley of Mexico and saw there the three pyramids of the abandoned city of Teotihuacán: The Sun, the Moon, and Quetzalcoatl. They were told, by local Toltecs, that the Olmecs and the Mayas had said that the three pyramids represented essential aspects of the nature that renovates the social mind. The Mexicas grasped only the literal meaning of the name "Plumed-Serpent" in their language: "Quetzal-Coatl."

In the early 16th century, classical blindness in the first attention of the Aztecs (which embraced the Mexicas, the Acolhuas, and the Tepanecs) submitted to the quantum trickery imposed by a devious Spanish "Conquistador": Hernán Cortés. Moctezuma II, the 9th tlatoani-emperor of the Aztecs lost badly at war with the Spanish because the unusual strength of his Mexica warriors made him blind to the nonlocal deceit of a winged-serpent (Quetzalcoatl, or the second attention), who goes to Venus with the Moon and the Morning Star (within quantum coherence); and the quantum malice of Hernán Cortés won a total victory because he was blind to the return of Quetzalcoatl from Venus with the Evening Star as a Saint (within quantum decoherence and the Third Attention).

After reviewing central Mesoamerican legends and works by the anthropologist Carlos Castaneda (1968, 1972, 1987, 1991), I matched the going Quetzalcoatl in (2) to the "Nagual" (in the left upper part of Figure 4) posited by Castaneda's teacher, Don Juan. The Nagual represents our nonlocal capacity for using quantum coherence in climbing the ramp depicted at the center of Figure 5. In doing that, the Nagual embraces simultaneously (the mark of infinite speed, with $p = |1\rangle$ and $|0\rangle$ [ket one and ket zero]) the *known* ([1] autism, the serpent-coatl, existence, and unity at the left [with $p = 1$]) and the *unknowable* ([-1] schizophrenia, the bird-quetzal, nonexistence, and nothingness at the right [with $p = 0$]).

The finite speed of Don Juan's autistic "Tonal" in Moctezuma II is echoed today by the blindness of the English Muggles that envy the magical ubiquity of Harry Potter to see *his past self* (Rowling, 1999) in the hyperspace of the unknown. Muggles left with a solitary Tonal lack the infinite speed of the Nagual that enlivened the treacherous second

attention of Hernán Cortés and Quetzalcoatl's going journey to Venus. They also lack the nothingness that allows the heroic Third Attention of Harry Potter to block the malicious second attention of Lucius Malfoy and of his mentor, the Dark Lord, in protecting the quantum world of the unknown that readjusts the classical world of the known.

3.8 The Alliance of Classical and Quantum Computing in the Teachings of Don Juan

The upper part of Figure 5, the upper part of the medal in Figure 4, and the red hair in Figure 3 show that the Nagual (in the going Quetzalcoatl and the second attention) can be associated with a quantum qubit (|1› and |0›) (Loyd, 2006) and with the coherence that feeds infinite speed in quantum computing. Autistics (at the left in Figure 5) cannot fathom the word "maybe" in the going voyage of Quetzalcoatl (the upper part of Figure 5); and schizophrenics (at the right in Figure 5) cannot return with Quetzalcoatl (the lower part of Figure 5) to the familiar world in which "yes" seeks to cancel "no." The limitations of autistics and schizophrenics point at the *star-filled cloak* of the Virgin of Guadalupe, whom Saint Juan Diegotzil saw on a hill of Tepeyac (within Mexico City).

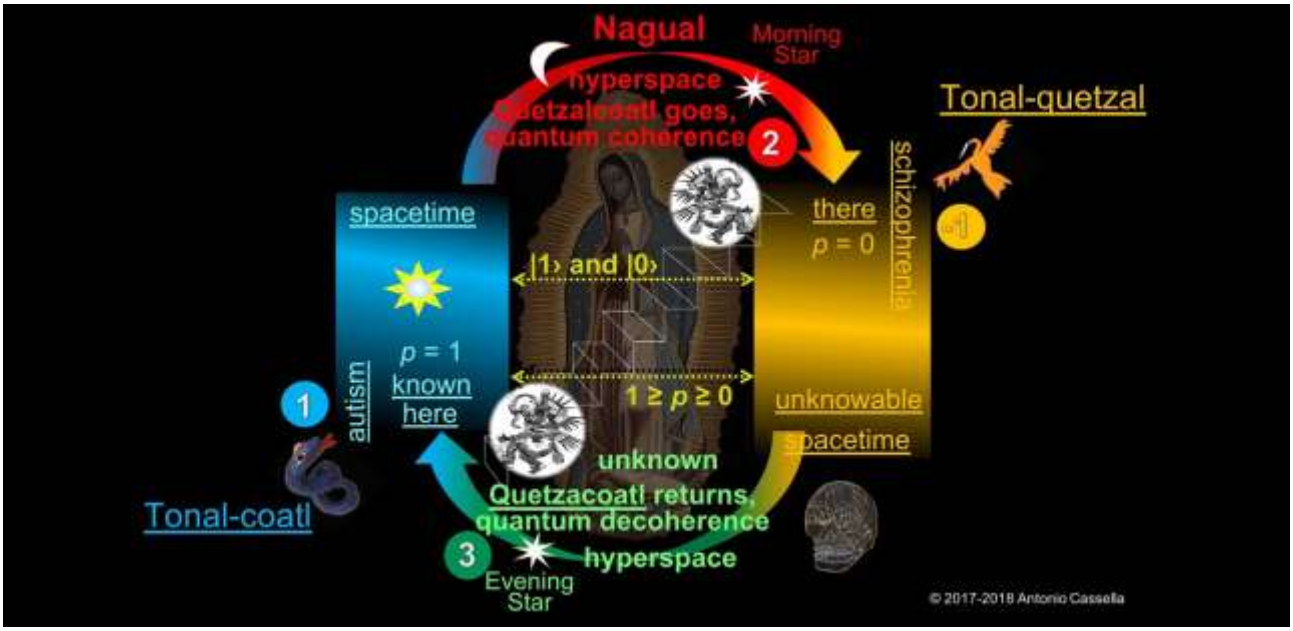

Figure 5. The journey of Quetzalcoatl between an autistic serpent and a schizophrenic bird

The return of Quetzalcoatl to natal landmarks also evokes the Eagle that, in Don Juan's view, harmonizes the hyperspace of the Nagual with the spacetime of the Tonal. As shown by Neil Armstrong and Buzz Aldrin in 1969, the landing of the Eagle on an unknown Moon was not an easy feat. Unlike Armstrong and Aldrin, the empty Eagle never returned to Earth. Similarly, in the teachings that Carlos Castaneda received South of the border, down Mexico's way, from the unfathomable Don Juan, an irredeemable explorer of hyperspace—Don Genaro—complains about his difficulty to return to his native Ixtlán. Don Genaro cannot (or does not want to) find the Eagle of the Third Attention.

If a social group defeats its competitors (the third column in Figure 5), then the Eagle of creativity in quantum computing, the central column of Figure 5, and the cloak of the Virgin of Guadalupe will vanish; Don Genaro will never return to Ixtlán; and Quetzalcoatl will never return to his pyramid in Teotihuacan. Confrontations between the familiar and the unfamiliar, friends and enemies, or opposite tenets warm the biota and humans. Without confrontations, life vanishes; with just confrontations, life also vanishes. Hence, more than winning over our enemies, confrontations should motivate us to search for, find, and solve any underlying problem. However, our malice may prevent us from pursuing a better reality for both our friends and our foes under the social mark of the returning Quetzalcoatl.

The yearn for the return of the Eagle of the Third Attention was recognized by ancient mystics and philosophers.

3.9 Nature and the Mind in Ancient Mysticism and Philosophy

The union of classical and quantum computing came into the open in the 6th century BCE (Before the Common Era) when:

a) the Olmecs started and passed on to the Mayas, the Toltecs, and the Aztecs the mysterious legend (the middle column in Figure 5) of the quantum journey of Quetzalcoatl to Venus with the Moon and the morning Star (phase 2 in red at the upper part of Figure 5), and of his return to Earth with the Evening Star (phase 3 in green at the lower part of Figure 5);

b) Buddha, who called himself "Tathāgatha" ("Thus Gone," or quantum coherence, and "Thus Come," or quantum decoherence), returned from the unknown (the middle column in Figure 5), after escaping the bite of the unknowable (the column at the right);

c) the Chinese Lao Tzu (the Old Master) vanished into the Tien-Shan Mountains (the central column in Figure 5) that overlook the Taklamakan Desert, after flooding Kong-Fuzi (Confucius) with the following verses, *"Unbending rigor* (classical computing and the first attention) *is the mate of death, and yielding softness* (quantum computing), *company of life; the strong and mighty topple from their place* (under the inhumane use of the second attention), *and the kind and yielding* (the Third Attention) *rise above them all* (Lao Tzu, 1891);

d) Heraclitus, an Ionian-Greek philosopher, wrote about the power of an arch-bow and of his Logos in any natural system, "*They do not apprehend how being split* (coherence, or the going Quetzalcoatl in the upper middle column in Figure 5) *it is rejoined with itself* (decoherence, or the returning Quetzalcoatl in the lower middle column of Figure 5)." (Cappelletti, 1969, p. 61); and

e) Zechariah (11-13) (Katznelson, 1991) warned us that the loss of the metaphorical staff No'am (quantum computing in the second attention) followed by the loss of the staff Hovalim (repetitive conservation, or classical computing in the first attention) will destroy human civilization and two thirds of the biota.

3.10 The Play of Classical and Quantum Computing in the Rise and Fall of Civilizations

Sacred Texts offer numerous examples of the alliance of the second with the first attention, in the arms of the Third Attention. For example, Joseph Smith was able to translate the *Book of Mormon* because the Angel Moroni lent him two crystals: Urim (nonlocal computing) and Thummim (local computing) (Mormon, 1830-1981). The crystals Urim and Thummim can be compared to the homonymous stones kept in the Ark of the Covenant, to the Toltec Nagual and Tonal, and to the staffs No'am and Hovalim mentioned by the Biblical prophet Zechariah. Zechariah's warning about God's inclination to break the staffs No'am and Hovalim in the future (11:07-14; 13:07-08) agrees with the rise of a chaotic world at the turn of the 21st century.

To dictators who lean on evil to dispel chaos, the perfect order symbolized by the brotherhood sought by the staff Hovalim may seem better than imperfect disobedience. And yet, the anomalous development of autistic brains ruled by the aim for perfect order suggests a different story: The alliance of perfection with less-than-perfection in the Third Attention escorts progress in nature, social groups, and people that protect democracy from the sterility of ideology and the malice of dictators. In Venezuela, for example, the brave Óscar Alberto Pérez freed the Third Attention of the world.

3.11 The Anatomical Anomalies of the Autistic Brain

The anatomical examination of the brains of deceased autistic children and adults by Bauman and Kemper (1994, 2006) may aid the exploration (in the next section) of the two one-way neural bridges that sustain the cooperation between the perfect conservation propitiated by the cerebrum and the less-than-perfect renovation conciliated in cerebellar microcomplexes. In autistics:

a) brain damage is centered in the limbic system, the brainstem nuclei, and the cerebellum;
b) cerebellar hemispheres show a reduction of the number of Purkinje cells;
c) neurons in the cerebellar nuclei are distended, weak, and less numerous than normal;
d) the inferior olivary neurons are closer to the periphery than to the center; and
e) damage to the autistic brain occurs at approximately the 28th week of pregnancy.

The reported observations by Bauman and Kemper support the conclusion that, in the hyperspace impaired in autism and schizophrenia, the cerebellum and the brainstem unite their capabilities and features in readjusting the information memorized in the spacetime of the cerebrum through the limbic system (Cassella, 2017a).

The search for the neural roots of memory in the first attention, learning in the second attention, and social progress in the Third Attention is broached in the ensuing discussion.

4. Discussion

The logos psychological heuristics introduced earlier is used here to explain the organization of the macrocosm studied by astrophysicists, the microcosm explored by quantum physicists, human groups studied by anthropologists and sociologists, the creative discourse studied by psycholinguists, and the neural circuitry behind our laughing at a pun.

4.1 The Implications of Local and Nonlocal Computing in Nature and the Mind

Figure 6 offers a visual rendering of the odd relationship between spacetime and hyperspace:

A. The central azure circle is equivalent to the upper part of Figures 1 and 2, the serpent in Figure 3, the left arrow in Figure 4, and the left column in Figure 5;

B. the black ring is equivalent to the lower part of Figure 2, the union of the red and the green hair of Figure 3, the medal of Figure 4, the star-spangled mantle of the Virgin of Guadalupe, and the stair of Figure 5; and
C. the external orange halo is equivalent to the bird in Figure 3, the right arrow in Figure 4, and the right column in Figure 5.

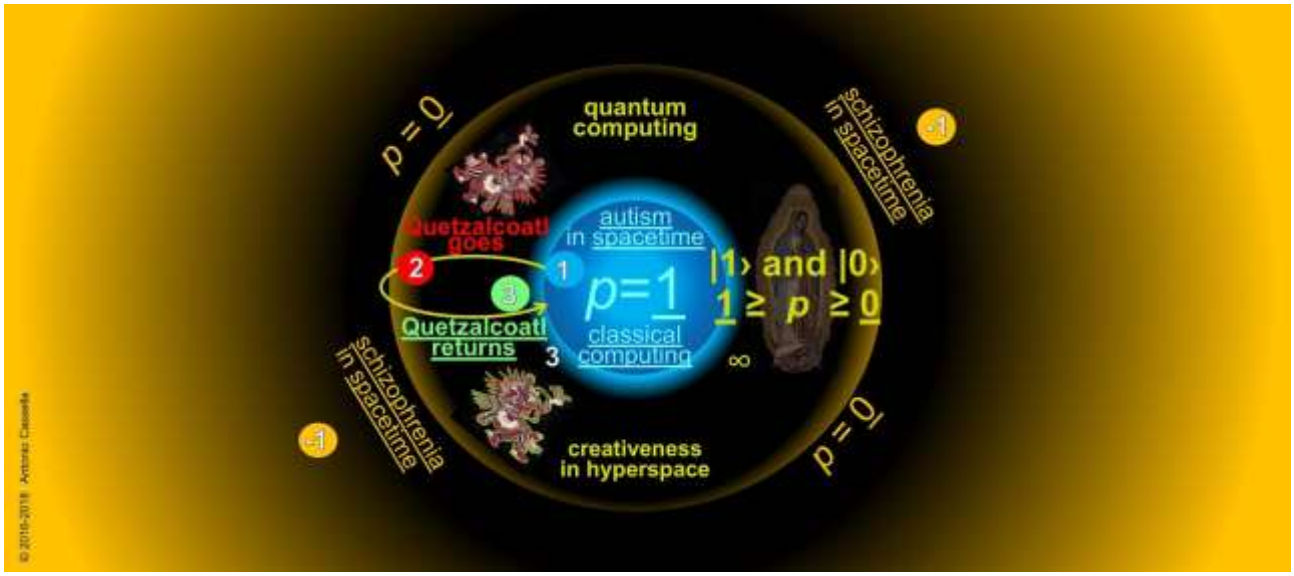

Figure 6. The going and coming of the implicit self between autism and schizophrenia

If we turned Figure 6 around a vertical axis, we would obtain an orange nothingness that contains a dark and nonlocal sphere with a cobalt and local ball in its center.

Among many possible examples of that mode of organization are (Cassella, 2017a):

1. *The alliance* of autism (in the blue sphere) with schizophrenia (in the orange emptiness) that animates the going and returning journey in the black sphere of Quetzalcoatl, Buddha, and Muhammad (Dawood, 2006);[2]
2. *a social group*, in which the classical blue ball stands for the unescapable authority of the law and for the central authority of law-enforcing officers; the surrounding black sphere reflects the quantum capacity for adjusting the law to unforeseen change; and the orange desolation echoes the subverting actions introduced by radicals;
3. *any culture*, in which the blue sphere guards the values shared by all members, the black ball keeps the capacity for changing fixed values, and the orange halo signals the dearth of values in unworthy enemies;
4. *any language*, in which the azure center hosts the semantics and syntax of "invariable" linguistic rules, the dark globe includes the metaphors that enrich spontaneous discourse, and the orange vacuum indicates the Tower of Babel made by the incomprehensible words and rules of alien civilizations;
5. *the human brain*, in which the central blue bubble denotes the "invariant" memories kept alive by our autistic facet in the cerebrum; the black ball denotes the quantum computing performed in cerebellar microcomplexes; and the orange space stands for the schizophrenic recollection of what never was, is, or will be, in the denial of reality that the cerebellar cortex passes on as truth to the cerebral cortex of the mad;
6. the play *Hamlet*, in which the azure ball stands for Queen Gertrude, Chancellor Polonius, and his son Laertes; the black mantle represents Hamlet's words "to be or not to be;" and the orange space touches Ophelia (fiancé to Hamlet, sister to Laertes, and daughter to Polonius) and the shocking death of the traitorous King Claudius;
7. any *Sacred Text*, in which the azure sphere would represent literal interpretations, the black envelope would point at the esoteric teachings hidden behind literal interpretations, and the orange desolation would indicate the failure to interpret the divine wittiness hidden behind its visible truths;
8. the central blue sphere of the *visible locality* that hosts the Black Stone; the black globe and *the counterclockwise tawaf* (circling) performed seven times by Muslim Hajis around the Black Stone in Mecca; the orange deserts

[2]The mathematical meaning of the going journey (Al'Isra) of the Prophet to the Farthest Mosque and of his return (Al-Mi'raj) to Mecca is interpreted in Cassella (2018).

that must be crossed before arriving to Mecca; and the union of the three features in the Black Stone that collects the prayers directed at it from every corner of the Earth;

9. *an orchid*, in which the central spot becomes classical locality, the proximate black world represents the sepals and petals of nonlocal existence, and the orange blotch makes the air that supports those quantum explorers that leave the orchid carrying with them the pollen needed by other plants;
10. *planet Earth*, in which the blue ball makes the solid iron-nickel core; the black field stands for the magnetic field, the magma, the cycle of water, the atmosphere, and the life that prospers on Earth's shell; and the orange area around the black sphere embodies the space among the planets of the Solar System;
11. *any galaxy* in which the blue center stands for the black hole that eats up its stars; the black globe denotes the assembly of stars that rise in its precincts, while the orange space shows the void that separates galaxy clusters;
12. *the Big Bang*, symbolized by the autistic blue bubble; expanding galaxy clusters, located in the black realm of quantum computing; and the vexing confines of the universe in the orange emptiness;
13. *the local halo of dark matter* at the center of the blue sphere; the black sphere of nonlocal–dark energy that pushes galaxies away from each other; and the orange edges of the universe that pull the coherence movement initiated by the Big-Bang, before submitting to the decoherence of a Big Crunch; and, finally,
14. *a molecule* of oxygen, in which the azure pellet suits strong interaction in the embrace of quarks and gluons in the central locality of its two atoms, the black range points at the probabilistic orbitals of its 16 electrons in nonlocality, and the orange plot agrees with the void that separates the molecules of oxygen in the atmosphere.

4.2 The Characteristics of Local and Nonlocal Computing

The three columns of Figures 5 and the three zones of Figure 6 can be expanded into the three columns of Figure 7.

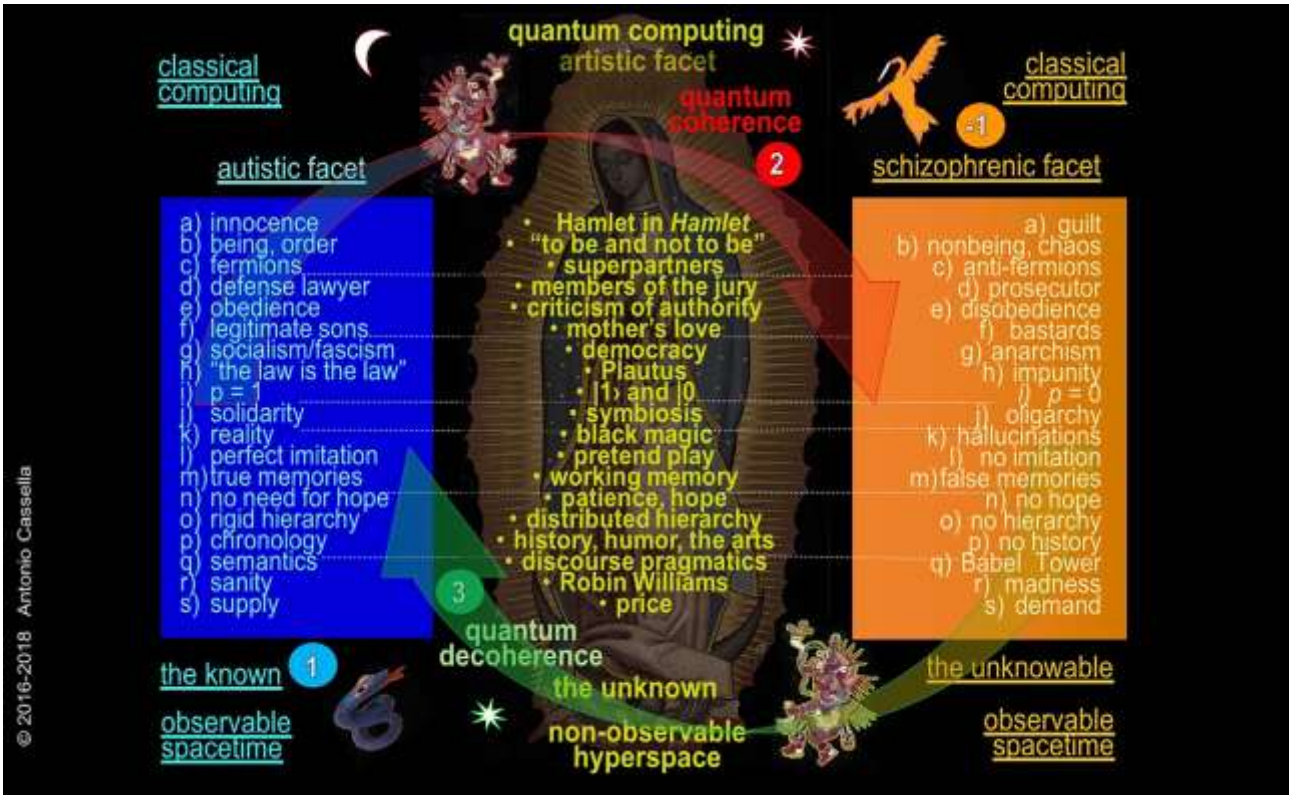

Figure 7. Examples of autistic, creative, and schizophrenic aspects of information processing

As with Figure 5, Figure 7 shows that the fall of the column at the right would bring the elimination of the central column and the obliteration of the Virgin of Guadalupe. In Figure 7:

a) Prince Hamlet wanders between the innocence of his uncle Claudius (at the left) and the crazy possibility (at the right) that Claudius has killed his brother and Hamlet's father in gaining the throne of Denmark;

b) Hamlet's "to be or not to be" should be read "to be and not to be" when that Prince contemplates simultaneously autistic order (the left column) and schizophrenic chaos (the right column);

c) dark superpartners energize fermions and anti-fermions in fostering the expansions and contractions of transitory universes;

d) in a fair trial, in which the accused party is innocent until proved guilty, the members of a fit jury and an impartial judge (at the center) have to listen to the arguments of both the prosecutor (on the right) and the defense lawyer (on the left), before deciding if the defendant is innocent or guilty;

e) authoritarian leaders (at the left) will stop any criticism (at the center) in favor of their need to deter disobedience (on the right);

f) unlike the love of a true mother for all her children (at the center), the king will leave the crown to a legitimate heir (on the left), and not to a bastard (on the right);

g) democracy prospers between socialists/communist/fascists ruled by ideological rigidity and anarchists imbibed with unlimited flexibility;

h) under the rule of law in "parcere subiectis et debellare superbos" ("pardon the meek and kill the rebellious"), which forgave respectful characters (the left column) and vanquished the arrogant (the right column), Romans were flexible only toward good comedians (Titus Maccius Plautus in the central column);

i) quantum computing (ket 1 and ket 0, at the center) plays between autistic respect ($p = 1$) and schizophrenic disrespect ($p = 0$);

j) symbiosis in a social group plays between solidarity among the poor and the special interests sought by an egotistic oligarchy;

k) progress behind miracles, Black Magic, and the Black Hand responds to the play between reality and hallucinations;

l) pretend play dances between perfect imitation and no imitation;

m) in cerebellar microcomplexes, new schemata are found by the working memory that courts both the true memories collected in the cerebral cortex and the false memories stored in the cerebellar cortex;

n) patience and hope sustain the implicit self in his or her will to escape the hopeless world of the mad and return to the familiar world in which the explicit self has no use for hope;

o) the distributed hierarchy of cerebellar microcomplexes (at the center) contains the rigid hierarchy of the association cortex (at the left) and the absence of hierarchy in irreversible schizophrenia (at the right);

p) history navigates between chronology (left) and the lack of historical documents (right);

q) metaphor in discourse pragmatics overrides both the rigid meaning protected by semantics and the Tower of Babel in which no individual will understand the words uttered by a neighbor;

r) the creative dimension of Robin Williams gave his best between the sanity of his autistic facet and the insanity of his denying facet; and, finally,

s) the fair price of any standing good, which good communists cannot stand, rests on the creativity that guide the intrinsic supply and demand.

4.3 The Complementarity of the Principles of Local and Nonlocal Computing within the Logos Heuristics

As with the downward trend of the price of electronic goods, fair prices, the vigor of a currency, and economic growth result from the creativity generated by balancing the principles of classical computing with the principles of quantum computing. Ten sets of principles (more principles can be added) are illustrated in Figure 8. Prior to discussing these principles in relation to quantum mechanics, two suppositions ought to be highlighted:

A. Autistics and the autistic facet of our minds follow the local principles of the known (at the left in Figure 8);
B. autistics are blind to the nonlocal principles of the unknown (at the right in Figure 8).

The conclusions gained in the exploration of the cosmos, game theory, and of the subatomic world accord with the ten sets of principles detailed in Figure 8:

a) The *Principle of Impenetrability* supports Pauli Exclusion Principle, by which electrons with the same quantum number cannot simultaneously fill the same subatomic orbital;

b) Richard Feynman (1985) proposed that, unlike electrons and all kinds of material fermions anchored by an explicit mass, virtual photons among bosons are eager to move at a superluminal speed (the *Principle of Ubiquity*);

c) in his doctoral thesis of 1924, Louis De Broglie proved that all electrons and all fermions associated with massive particles may act as either waves or particles, which agrees with either the principles of quantum or the principles of classical computing, and with the second or the first attention;

d) after passing through an orifice in accordance with the *Principle of Locality*, a photon or an electron may pass through two orifices at the same time (the "double-slit experiment"), in agreement with the *Principle of Ubiquity* and with two simultaneous movements (Feynman, 1985; Icke, 1995; Lloyd, 2006);

e) instantaneous communication in quantum entanglement evokes the *Principle of Ubiquity*;

f) after one hour, a cat trapped in a box in which radioactive decay may or may not release a poison (Erwin Schrödinger, in McEvoy and Zarate, 1995) will be either dead or alive (the *Principle of Locality*), under the local watch of the experimenter who opens the box;

g) Niels Bohr, however, suggested that after one hour, Schrödinger's cat will be simultaneously alive and dead (the *Principle of Coincidence* and the *Principle of Ubiquity*) in the quantum doubt of an imaginative onlooker;

h) the fact that the speed and the position of a subatomic particle *cannot* be observed in the *locality of spacetime at the same time* brought Heisenberg to formulate his Uncertainty Principle, within an interpretation that stresses *the mutual embrace of two complementary values in the nonlocality that fills quantum hyperspace*; and finally,

i) Icke's equations on symmetry (1995) imply that matter-minded fermions may become energy-minded bosons by *rotating* 180 degrees in quantum nonlocality (*the fourth set of principles*).

Figure 8. Principles of locality in spacetime and principles of nonlocality in hyperspace

The Third Attention of an exceptional individual (for example, Lao-Tzu, Buddha, and Quetzalcoatl) may revitalize the universal symbiosis (3) between the principles of spacetime (1) and the principles of hyperspace (2); locality (1) and nonlocality (2); the known (1) and the unknown (2); and coherence (2) and decoherence (3).

The interplay between coherence and decoherence renews the universe, its stars, its molecules, and the social mind. Our smile after perceiving a pun exemplifies the deeds of the grace that fills whoever solves a problem to win and smile with others. Humor and joy result from the miracle by which the Third Attention balances local respect with prejudice in the first attention, non-local talent with malice in the second attention, and the rigidity of the first attention with the flexibility of the second attention.

The Third Attention could explain the happiness that filled "Ca' Zoiosa" ("House of Joy"), the "School of Princes" and of the promising poor. This school was built in Mantua in the 15th century by the inventor of Humanism and Renaissance: the "Prince of Educators," Vittorino de' Rambaldoni, also known as "Vittorino da Feltre." Vittorino taught his students—among them, the future "condottiere" Federico da Montefeltro—never to become overwhelmed by defeat. For example, having lost his right eye in a friendly tournament to the precise cut of a spear, Federico cut the bridge of his nose to see better with his left eye in continuing to win as a good sport over bad challengers.

Simultaneous tension in hyperspace allows us to shoot precisely a spear, an arrow, or a multitude of arrows into spacetime. In the next subsection I will broach the implications of tension in the winning ways of Shi Huang-di. The first Chinese emperor combined the power of nothingness in a pointed head, autistic brotherhood, and arty deceit 17 centuries before Federico da Montefeltro.

4.4 The Human Brain Seen as a Compound Crossbow

King Ying Zheng of Qin became Emperor Shi Huang-di when he united the seven Chinese kingdoms of Qin, Han, Zhao, Qi, Wei, Chu, and Yan in 221 BCE. His success followed the wide use of powerful crossbows in which the tension was easily discharged by unlocking a factory-made, bronze trigger. The grave of Shi Huang-di and his Terracotta Army, in Shaanxi near Beijing, reinforces the metaphor that the organization of the human brain agrees with the repetitive precision of a crossbow.

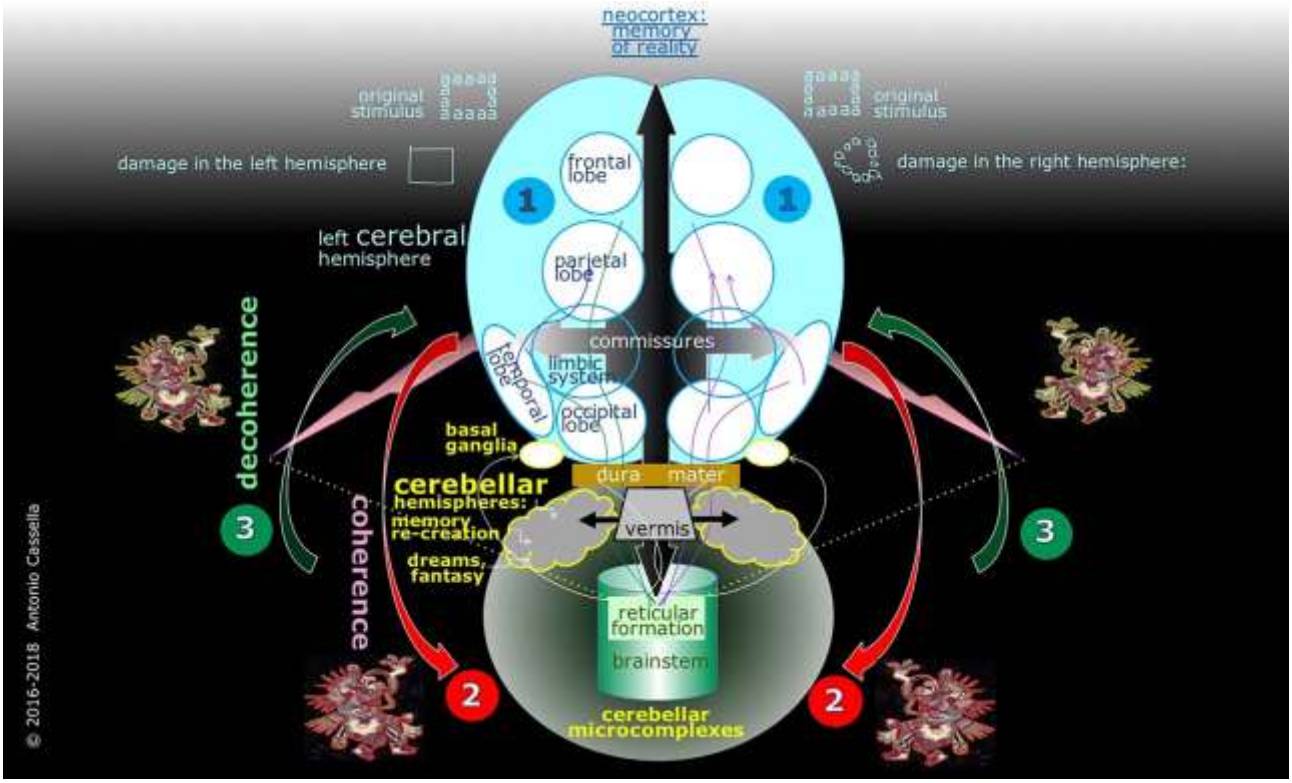

Figure 9. The human brain as a crossbow

The following six propositions illustrate the mystery behind the operation of the crossbow hidden in the human brain:

1. Within classical computing, the four lobes of each cerebral hemisphere build the spacetime of the "legitimate" interpretations perceived and memorized by the explicit self. We know that in right-handed individuals, the right hemisphere is in charge of wholes; and the left hemisphere, of details.
2. The fact that autistics see either a tree or the wood, but cannot *combine the particular with the universal*, suggests that our cerebral hemispheres serve the autistic facet of the mind that loves the "reality" attached to local sensations and schemata. The big head of many autistic individuals reflects the overdevelopment of the cerebrum and the autistic facet of the normal mind.
3. With the help of the two limbic systems, the left and the right cerebral hemispheres make the classical left and right arms of a metaphorical crossbow, which links the repetitive precision sought by local computing to the

tension accumulated (the going Quetzalcoatl in quantum coherence) and released (the returning Quetzalcoatl in quantum decoherence) through nonlocal computing in cerebellar microcomplexes.

4. In dealing with the power of ambiguous nonlocality—which lies in the implicit self, beyond the locality of wholes and details that our explicit self deems either true or false—the two cerebellar hemispheres and the two basal ganglia make the string of the crossbow.
5. The trigger, the butt plate, and the implicit archer would lie in the brainstem.
6. The first attention leads the cerebrum to remember known facts; the second attention leads cerebellar microcomplexes to dream of unknown facts; and the Third Attention leads the whole brains to learn by connecting the known with the unknown.

The local opposition between the detail-arm and the whole-arm of classical computing in the association cortex, the nonlocal union of detail and aggregates in the quantum computing that feeds cerebellar microcomplexes, and the alliance of classical and quantum computing, which crosses the dura mater (Figure 9) in conscious returning or feeds directly the brainstem in unconscious returning, are not limited to the whole Central Nervous System (CNS). They occur at many levels in the CNS of vertebrates, even at the level of gene-control, in the unit-synapse that hosts the basic scheme of communication among neurons.

4.5 Local and Nonlocal Computing in a Synapse

If neurotransmitters responded only to the two possibilities of reasoning after the facts (yes-yes = excitation, and no-no = inhibition), then, any synapse would function well with only two transmitters and two receptors. Some neurotransmitters, though, surpass the simple "yes-yes" or "no-no" attached to classical computing (Figure 10).

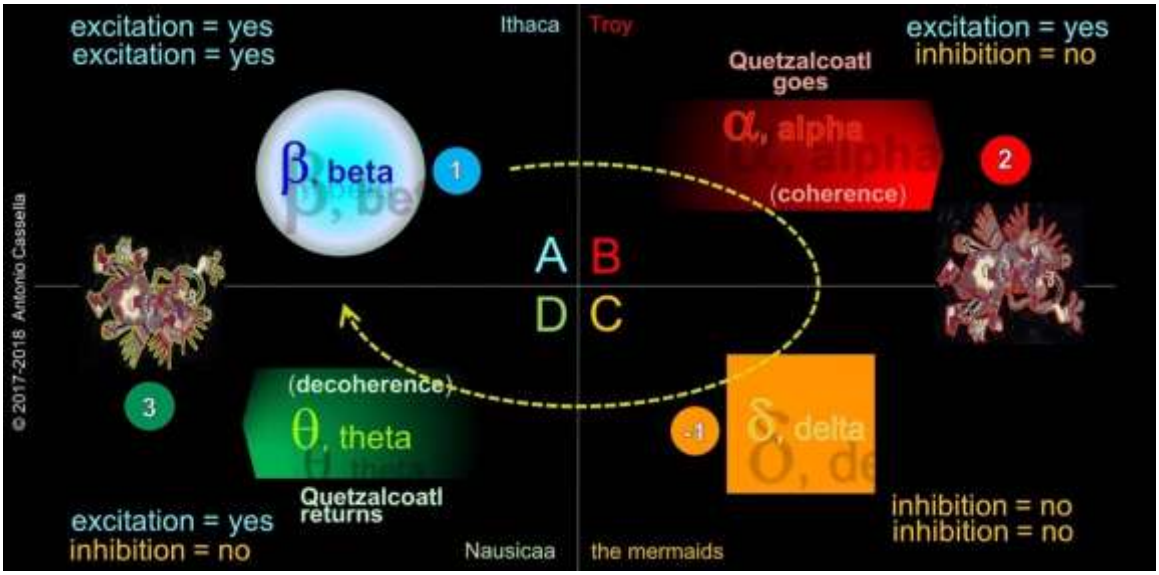

Figure 10. Local and nonlocal computing in a synapse

We know that neurotransmitters can cause long-term changes and trigger slow metabolic processes by switching particular genes. That feat points at the reality of both classical and quantum computing in a synapse. Figure 10 shows the local and the nonlocal possibilities of communication in a synapse.

One could compare local excitation inside a synapse with an autistic "yes-yes" situation (quadrant A), in which one *imagines what one sees;* and local inhibition, with a schizophrenic "no-no" situation (quadrant C), in which one *sees what one imagines*. However, a hypothesis can be raised that a synapse goes beyond classical computing in the first attention: A synapse may accommodate the flexible behavior inherent in the quantum computing sought by the second attention.

Odysseus-Ulysses, for example, used his malice within quantum coherence (quadrant B and alpha waves in Figure 10) to help Agamemnon conquer the city of Troy through deceit (2), by leaving on the beach of Troy a wooden horse, whose belly was full of hidden Greek soldiers. After burning Troy to the ground, Odysseus resisted the chants of the mermaids (quadrant C and delta waves) (-1). That feat enabled him to continue his travels and to receive the gracious help of Princess Nausicaa (yes-no, quadrant D and theta waves) in the island of the Pheacians (3). As an inspiration to the Third Attention, Nausicaa moved her father, King Alcinous, to provide a ship to Ulysses, and thus help him return to

his natal land—the Ithaca island—to his wife Penelope, and to his son Telemachus ("yes-yes," quadrant A, and beta waves) (1).

The design of the *Odyssey* leads us to the falsifiable hypothesis that brain waves reflect the four quadrants shown in Figure 10:

1. In quadrant A, beta waves (with frequencies between 12.5 and 25 cycles per second, or hertz) correspond to the consciousness of reality in the first attention (1) that moves autistics and the autistic facet of the normal mind;
2. in quadrant B, alpha waves (with frequencies between 7.5 and 12.5 hertz) agree with quantum coherence and the second attention (2) impaired in autism;
3. in quadrant C, delta waves (with frequencies between 0.5 and 3 hertz) match the deep unconsciousness of the maddening facet (-1) vested by persons who see through the neurochemicals of their dreams; and
4. in quadrant D, theta waves (with frequencies between 4 and 7 hertz) relate to quantum decoherence and to the Third Attention (3) of the explorer that returns to a greener familiar world.

4.6 Nonlocal Computing in a Motor Neural Circuitry

In Figure 11, I introduce the suggestion that: a) alpha (2) and theta (3) waves are guided by cerebellar microcomplexes (at the right); b) beta waves (1) belong to the cerebral cortex (at the left); and c) delta waves in (-1) are born in the denial of internal models stored in the molecular layer of the cerebellar cortex before an illegitimate deployment endorsed by the brainstem.

Figure 11 illustrates also the known circuitry under which the motor signal initiated by pyramidal cells in the motor cortex is sent to nuclei in the brainstem, and from there to the cerebellum. Moving a limb or the head may please the self only, under the guidance of the first attention; or the self and the other under the guidance of the Third Attention; as did Zinedine Zidane in 2006 by landing a headbutt into the humanity of Marco Materazzi (Cassella, 2017a).

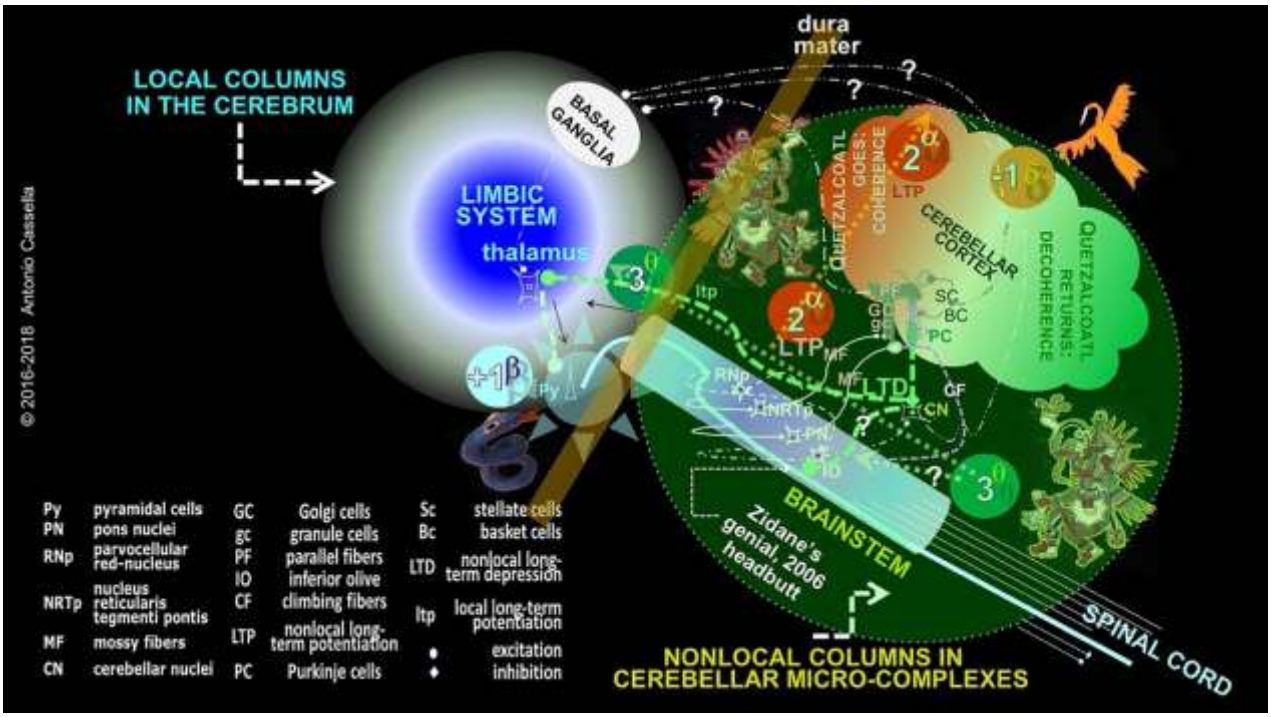

Figure 11. Sketch of the readjustment of a motor circuitry in the human brain

By exciting directly a specific nerve in the spinal cord without involving the cerebellum, the movement shown in Figure 11 may describe the bad will of the Mauritanians archers that made an urchin of Saint Sebastian in the 3rd century CE. By involving a specific cerebellar microcomplex, however, the movement of an arm may point at Mr. Bean's good will in the 21st century. In a modern TV episode, Mr. Bean (Rowan Atkinson) shoots an arrow into a balloon of a cluster of balloons, so as to force the landing of a baby cart and of a sleeping baby into the arms of his overjoyed mother. Humorous grace in the hyperspace of the second attention may change the pain attached to the spacetime of the first attention into the joyful progress sought by the Third Attention: The humble role of the gracious Mary and any mother.

In Figure 11,

a) locality in the first attention guards the integrity of the schemata stored in the cerebral cortex (at the left);

b) nonlocality in the second attention crosses opposite models of cerebral schemata by means of the Quetzalcoatl that goes with quantum coherence in the divergence of a cerebellar microcomplex (at [2]); and
c) the combination of local and nonlocal computing within quantum decoherence and the returning Quetzalcoatl (at [3]) harmonizes the schemata stored in the cerebral columns with the dreams created by the second attention in the going journey of Quetzalcoatl to Venus inside a cerebellar microcomplex.

Nonlocal computing in the second attention animates our dreams, whereas the Third Attention protects the blessed interpretation of a dream in seeking a better reality for our travel companions. Without reason, the infinite speed of the fantasies tackled by our implicit self (through the second attention of the going Quetzalcoatl) in cerebellar microcomplexes cannot alter the reality of the schemata guarded by our explicit self in the cerebral cortex. With the reason provided by divine grace, however, the Third Attention may bless the magical capacity for dreaming (at the edge of delta waves) of any person through interpretations produced by his or her theta waves. Blessed interpretations of Sacred Texts suggest that alpha and theta waves, or dreamy coherence and blessed decoherence, may also meet through the cooperation of different persons.

4.7 The Cooperation of a Dreaming Pharaoh with the First Joseph

For example, 39 centuries ago, a vacillating pharaoh (a metaphor for combining the authority inherent in the first attention with the fantasy attached to the second attention) dreamed that seven lean cows ate seven fat cows. The failure of the best magicians in Egypt to explain pharaoh's dream joined the recollection of pharaoh's chief cupbearer, who remembered that the grace of an imprisoned young Hebrew could see through the most mysterious dream.

Joseph's blessed Black Magic (the Third Attention) allowed him to explain pharaoh's portentous dream. In doing so, Joseph overruled the black magic (useless witchcraft) of pharaoh's purported "sages." The Pharaoh of the Egyptian Two Lands (a metaphor for the self that wanders from the forebrain to the back brain) empowered the humble Joseph (a metaphor for the imprisoned Third Attention) as Vice-Pharaoh. Pharaoh did that because he realized that *God was with Joseph*. Pharaoh's words (Genesis 41:38), "Can we find anyone like this man, one in whom is the spirit of God?" clearly suggest that we may empower the grace that permeates the Third Attention. In practice, Joseph's creative advice allowed the ruler of Egypt to avoid starvation in the known reality appreciated by the autistic facet of the first attention of his subjects.

The Third Attention of Joseph adopted an innovative planning strategy that smothered the power of sterile Egyptian barons to live exceedingly well by exploiting the sweat of others. Pharaoh's trust in Joseph reflects the magical alliance of classical and quantum neural computing displayed in the nonautistic brain when our Third Attention (Joseph) interprets the dreams of our magical second attention (Pharaoh). If we truly understood the old story of Pharaoh and Joseph, *we would store now the abundance symbolized by the seven fat cows*, before global warming and social disruptions would lead us all into the deadly embrace of the seven lean cows.

As with the sterility of any repetitive motor schema stored in the rigid frame of knowledge guarded by the first attention in the cerebrum, the lack of imagination of a few robber barons (entrenched Mafiosi, bureaucrats, and foolish stakeholders) will cause the starvation of people at large, unless they listen to the graceful readjustments propitiated by a revived Steve Jobs, or Vice-Pharaoh Joseph, from their cerebellar microcomplexes.

Another suitable example of the humble grace that considers and interprets the dreams of quantum computing is made by Gabriel's words of coherence to Mary (Luke 1:28), "Hail Mary, full of grace!" followed by social decoherence in the words "*The Lord is with thee*!" A second example of coherence and decoherence responds to two verses in Matthew (6: 13), during the Sermon of the Mount where Jesus uttered, "and lead us not into temptation, but deliver us from evil." The third example of providential decoherence is drawn from the astonishing conversion of Saint Paul on the road to Damascus, after comprehending the questioning coherence that animated the Voice of God, "Saul, Saul, why do you persecute Me?" (Acts 9:3-4).

4.8 The Ability of Little Girls, the First Joseph, King Solomon, and Jesus to Recognize the Voice of God

In cerebellar microcomplexes (fed by the two cerebellar hemispheres, the vermis, the deep nuclei, the two basal ganglia [?], and the brainstem), our implicit archer may readjust stored cerebral signals after recognizing the nonlocal voice of the Archangel Gabriel, or the *Face of God*. For example, instead of completing the motor action initiated by her *autistic* facet (at the left in Figure 11), the *artistic* facet of a little girl will make fun of a visitor by denying, at the last second, her offer of candy (at the upper center, or [2], in Figure 11).

The ability to court mutually exclusive schemes—the miracle performed in the non-conceptual teasing chosen by a one-year-old girl, in the pretend play chosen by a two-year-old girl, and in the meta-representational lying achieved by a five-year-old girl—rests on an infinite speed. Superluminal speed is the calling card of the nonlocal computing performed in the cerebellar microcomplexes of humans and of all vertebrates. Within the infinite speed of cerebellar

microcomplexes, the implicit self in a human being, a hunting fox, and a mongoose that faces a poisonous cobra will "lie" in different places simultaneously (the Principle of Ubiquity) and recognize a different strategy in the nothingness of hyperspace (the Principle of Coincidence), before implementing it in spacetime (the principles of Locality and Impenetrability).

One example of the success of the second attention in atoned humans is Jacob's embrace of the infinite speed of quantum computing in wrestling with the *Face of God* all night long in Penuel. Before changing Jacob's name to Israel, the Archangel Gabriel twisted one of his straight legs and straightened his twisted brain. Solomon too won a definite victory over his Machiavellian implicit self when he ordered his guards to cut in two the baby claimed unfairly by an inhumane courtesan; and handed it to its true mother, ready to give it away in order to save its life. And in the Sermon of the Mount Jesus pointed at the Third Attention when he advised his listeners to go two miles with the traveler that asked for one mile only; and to give one's tunic to the fellow that wanted to take away one's mantle.

Sacred Texts, the feigning acts played by teasing little girls, and interspecies or intraspecies reciprocal assaults suggest that any animal or any atoned sinner may harmonize the being lodged in the cerebral cortex with the nonbeing lodged in the cerebellar cortex. That harmony implies the crossing of the nonlocal principles of Ubiquity and Coincidence with the classical principles of Locality and Impenetrability; without malice, in nonhuman animals.

4.9 The Superposition of Local and Nonlocal Computing in the Play of Convergence-Divergence performed by a Cerebellar Microcomplex

Figure 12 shows a hypothetical crossing of quantum with classical computing in a cerebellar microcomplex.

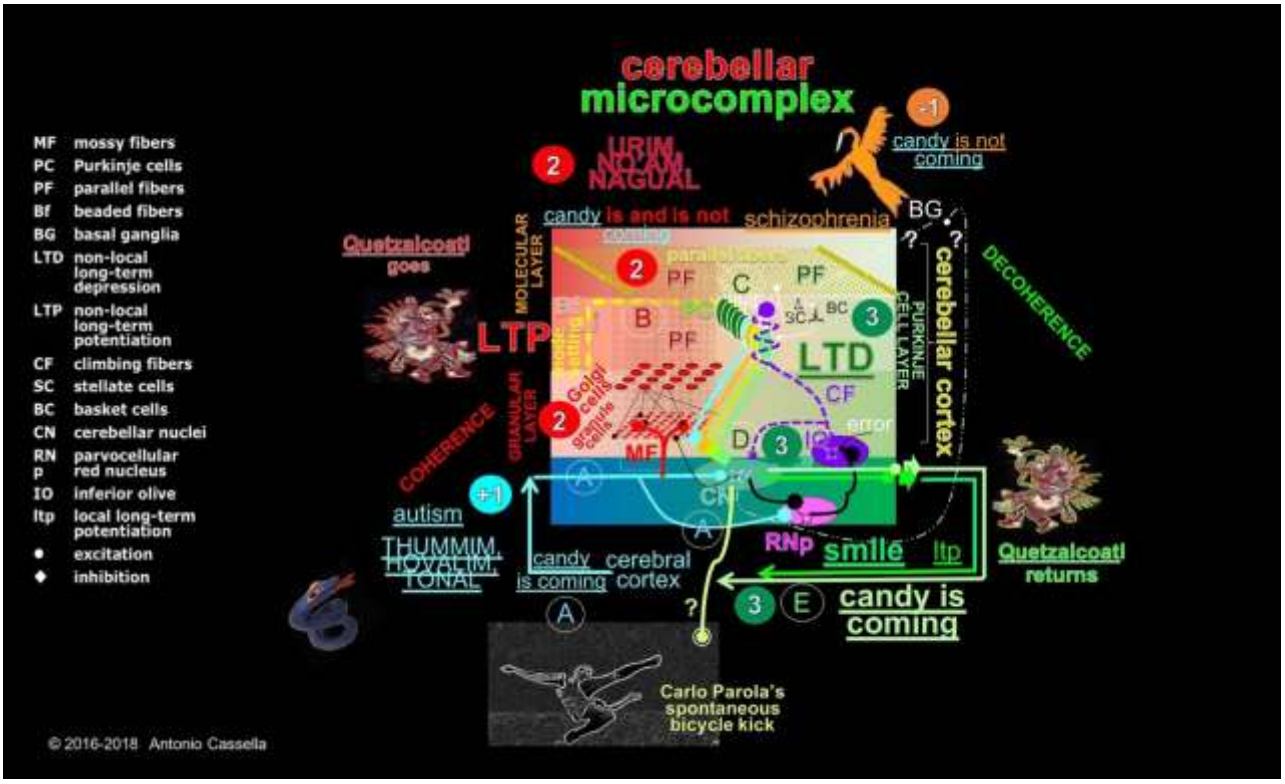

Figure 12. Local and nonlocal operations in the cerebellar microcomplex of a teasing little girl.

The mind of a teasing one-year-old girl, for example, may cross a *cerebellar forward internal model* (by calculating the position fixed by a set of known commands ([Ito, 1993]) with a *cerebellar inverse internal model* (by calculating the commands needed to achieve a fixed position ([Ito, 1993]). Both malice and grace may hide in her nonlocal crossing.

Indeed, the social facet of the little girl (or her Third Attention) will not give candy (quantum decoherence, at the right) (3) to a visitor before teasing him (quantum coherence and the Principle of Ubiquity [2], at the left) between her autistic (+1) and her schizophrenic facet (-1). The gracious decision by the spirited little girl to release candy, after playing with the autistic naïveté of the visitor, would rest on the Principle of Coincidence. Her cerebellar microcomplexes would help her superpose an inverse model of her giving right arm over a forward model of the taking right arm of the visitor.

According to Ito (2011), in the play staged in a cerebellar microcomplex:

a. one mossy fiber (MF) from the cerebral cortex excites 400-600 granule cells,
b. which divides into parallel fiber collaterals (PF), that
c. excites each 300 Purkinje cells (PC).

The previous assessment implies that a single mossy fiber may excite 180 000 Purkinje cells. That feat points at an astonishing *divergence*, or long-term potentiation (LTP), shown in the left portion of Figure 12. LTP matches the coherence phase of quantum computing.

Ito (2011) added that one Purkinje cell may be excited by 180,000 parallel fibers, which suggest an equally remarkable *convergence*. That convergence, shown in the right portion of Figure 12, agrees with cerebellar long-term depression (LTD) and the decoherence phase of quantum computing.

4.10 The Social Embrace of Long-Term Potentiation and Long-Term Depression in a Cerebellar Microcomplex

Long-term potentiation would correspond to the going journey of Quetzalcoatl to Venus; and long-term depression, to the returning journey of Quetzalcoatl. The social alliance of abundant competing options in long-term potentiation with fewer solutions in long-term depression—and Jesus' words (Matthew 22:14): "For many are called, but few are chosen"—cannot be understood without exploring the nuances of forward and inverse internal models.

In my interpretation of Ito's (2011) proposals, a *forward model* predicts the inertia of unchangeable actions or words, whereas an *inverse model* would correspond to a desired position or to a word that can be changed by the implicit self. Ito's assertion that the inverse model does not involve the ventrolateral thalamus (VL) suggests that the nonautistic act of replacing a cerebral schema with an inverse internal model, chosen through the advice of a contextual voice, is performed by the implicit self hidden in the brainstem. For example, in a match against Belgium in 1968, the Brazilian player Pele received a cross from the left wing when he had his back toward the goal. Right there, he tilted his body, jumped into the air, and unleashed a bicycle kick with his right foot. His impromptu action suggests that the implicit self crosses unconsciously the prediction allowed by a forward model with an unusual inverse model in order to achieve success with the sole guidance of the Archangel Gabriel. (See Carlo Parola's spontaneous bicycle kick in Figure 12).

In another example, Abrahamic Sacred Texts stress the teaching that our implicit self can differentiate the gracious voice of Gabriel from the malevolent voice of the Devil. This explains why Abraham crossed unconsciously a forward with an inverse model in his mind from killing to not killing his only son. Abraham obeyed God and disobeyed the Devil twice: When he lifted his arm to kill his first born (long-term potentiation between duty and defiance) and when he withdrew his arm not to kill him (long-term depression) (Cassella, 2017a). Abraham's victory (3) over his autistic (+1), his schizophrenic (-1), and his doubting (2) facets explains why good drivers slow down before a yellow traffic light, why better drivers slow down before a green traffic light, and why the best drivers save a life by stopping at a green light.

4.11 Stopping at a Green Traffic Light

Let us consider now a situation where someone is driving along a city avenue regulated by traffic lights. Our autistic facet knows that one has to press the brake pedal at a red light and that one can continue pressing the accelerator pedal at a green light. The local schemata to place our right foot on the brake pedal in stopping, and to place that foot on the accelerator pedal in going, are stored by our autistic facet in the temporo-parietal cortex. Nevertheless, the law also establishes that one can advance under a green light only if the competing drivers that cross the intersection also follow the law. That means that crossing at a green light, when a rival driver breaks the law by crossing at the red light, courts the Principle of Impenetrability, which asserts that *two objects cannot share the same space at the same time*.

In order to safely cross an intersection, without causing an accident in visible spacetime, in invisible hyperspace a cerebellar microcomplex in a humane driver has to cross the forward model of a car coming from a side road with a forward model of our *inertial* journey into that intersection. By virtue of the Principle of Coincidence, the implicit self that lies in both cars through the Principle of Ubiquity will suffer no ill in *sharing the same space at the same time* with multiple avatars of the self and of others at the oncoming crossing.

However, that ethereal self will realize that in the visible reality ruled by the laws of thermodynamics and the principles of Locality and Impenetrability, the crossing of two forward models will correspond to an accident. As a consequence, the microcomplex involved calculates the commands needed to avoid an accident, an inverse model is chosen, and our Third Attention instructs our right foot to leave behind the accelerator pedal and press the brake pedal, although the traffic light we are facing was green.

In the example of facing a yellow traffic light, *before either stopping or accelerating*, the divided attention of a nonautistic driver can listen to both the egoism advanced by the Devil and the generosity displayed by the Archangel Gabriel. Imprudent drivers exemplify the fascination that surrounds the wild call of the Devil. Likewise, prudent drivers exemplify the amusement attached to the good humor of Gabriel.

4.12 The Circuitry of a Graceful Pun in a Cerebellar Microcomplex

Imagine now that ancient Egyptians made fun of an unfriendly Queen Cleopatra in a weird Egypt where English was the language of communication (Figure 13). In this matter, imagine that Cleopatra would say "no!" to any request made by any of her subjects. In that humorous account, a courtier bet heavily with his peers that he would criticize the denying habit of Queen Cleopatra, and that the queen would not reprove him. True to his proposal, the courtier waited until Cleopatra approached the River Nile and admired a few lotus flowers. At this point, the courtier-jester approached the queen and said: "Among the flowers of our river, I will say that you are the Queen of *denial* (The Nile)."

Figure 13 illustrates the organization of a cerebellar microcomplex in the mind of the readers that smile at the pun about an English-speaking Cleopatra and her witty courtier.

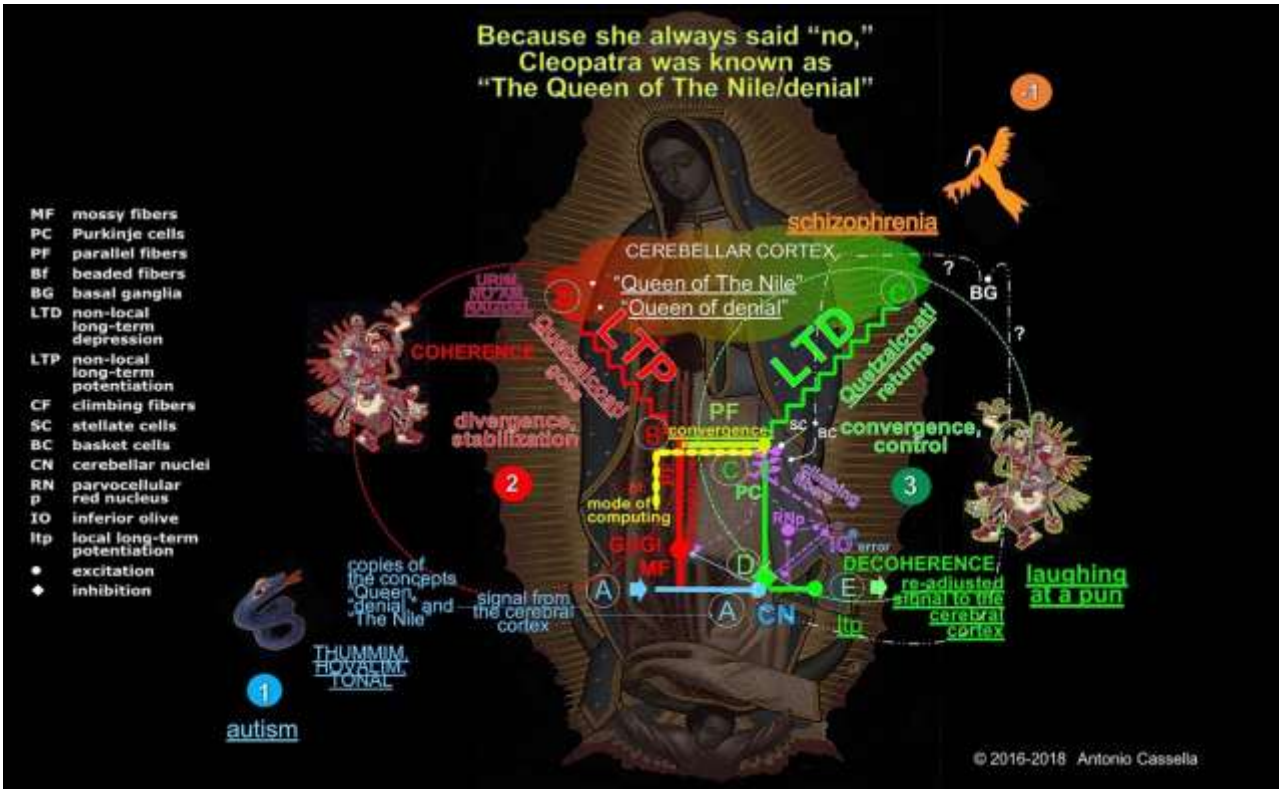

Figure 13. The circuitry of a pun in a cerebellar microcomplex

The involved quantum operations would undergo five steps in three phases:

A. Within the first step (phase [1] of classical computing and the first attention), a copy of a known schema stored in the cerebral cortex—for example, the sound of the wording "Queen of The Nile" (or candy is coming in the case of a little girl offering a sweet to a visitor)—is sent to the deep cerebellar nuclei and to the cerebellar cortex as a mossy-fiber signal. As I said, one may assume that the cerebellar cortex already stores an expendable and deniable copy of any undeniable and prototypical schema guarded in the cerebral cortex.

B. The second step (phase [2], or quantum coherence in the second attention) involves the division of the prototypical sound signal in two mutually exclusive interpretations, "Queen of denial" and "Queen of The Nile." The second step can be ascribed to quantum coherence and divergence-stabilization in the long-term potentiation (LTP) attached to the going journey of Quetzalcoatl (2). That strategy is similar to dividing the signal carried by a mossy fiber in Hamlet's words "to be or not to be."

C. The third step (phase [3], or the beginning of the Third Attention) calls for the convergence-control inherent in long term depression (LTD), quantum decoherence, or the return journey of Quetzalcoatl. In the third phase, the selected Purkinje cells are excited conjunctively by parallel fibers (PF in C) and by a unique climbing fiber from the inferior olive (IO).

D. Within the continuation of quantum decoherence in the Third Attention linked to the fourth step (phase [3] in [D]), the Purkinje cells that carry the solution to the problem at hand—or the right interpretations of a pun or a riddle—inhibit the involved cerebellar nuclei, while *the Purkinje cells that do not carry the solution are silenced*. Proper silencing evades the synesthetic person who savors *pizza* upon hearing the word *hi!*

E. Within the culmination of quantum decoherence in the fifth stage (phase [3] in [E]), the selected cerebellar nuclei send a readjusted signal to the cerebral cortex, which is invited to release a smile. In the case of a teasing little girl, the confirmation of her initial offer of candy to a visitor will cause a *quantum smile* on her face and a *classical smile* in the face of the lucky target.

4.13 The Marriage of the Tartar Prince Calaf with the Chinese Princess Turandot

In reaching a definite resolution—for example, giving candy away or stopping a car before a yellow traffic light changes into a red light—only the selected Purkinje cells will continue to inhibit the chosen deep cerebellar nuclei (D), while the competing Purkinje cells will be silenced.

Ito (2011) wrote that 97% of Purkinje cells are silenced through long-term depression in finding a new solution to a problem. That massive silencing suggests that cerebellar microcomplexes choose among several alternatives of possible movements. In the Gospel of Luke (1:42), Elizabeth's words about Mary's pregnancy, "Blessed art thou amongst women" confirm the advantage of considering competing alternatives (long-term potentiation and the going voyage of Quetzalcoatl). Besides, the words, "and blessed be the fruit of thy womb!" confirm the felicity of a choice blessed by the Holy Ghost (long-term depression and the returning voyage of Quetzalcoatl).

Contrary to the blessing dispensed by Elizabeth, the driver that kills a pedestrian by not moving in time his or her foot from the accelerator to the brake suggests that many people prefer the Devil to the Holy Ghost.

This situation matches the order of the Chinese Princess Turandot, in Puccini's eponymous opera, that all the ladies-in-waiting (Purkinje cells) who could not find the name of an unknown visitor (the Tartar Prince "Calaf") would be killed at dawn. During the night, the Chinese Princess herself finds the name "Calaf" from the *people of Beijing* (a metaphor for the dreamy neurons lodged in the cerebellar cortex). In the end, lovingkindness invites Princess Turandot to feign defeat, marry the son of King Timur, and bring progress to her Chinese society. Under the social magic of this ending, we are compelled to believe that love for Prince Calaf helps Princess Turandot reach her Third Attention.

Can the account of the love between Turandot and Calaf convince us to replace with blessed wishes (long-term depression) the curses (long-term potentiation) that we hurl at drivers that view pedestrians as if they were intolerable cockroaches?

5. Concluding Remarks

Autistics outperform controls in eye-blink conditioning and Zaitchik Photo task. By contrast, they underperform controls in the "disengage" phase of the "shift/disengage" protocol and in false-belief tasks. The combination of both results suggests that *the cerebellar microcomplexes of autistics do not look simultaneously at competing stimuli*. The logos heuristics suggests that this missing cognitive feat corresponds to a wronged quantum coherence in the information processing that may occur in a cerebellar microcomplex.

An impairment to quantum computing in the brainstem, in the cerebellum, and in the limbic system of autistics is the reason why they cannot entertain within quantum coherence discordant desires and insights, pronouns, puns, metaphors, the word "maybe," yellow traffic lights, and even the green lights invalidated by the competing drivers that disobey a red light stop signal.

Nevertheless, I could not grasp how competing solutions, which are communicated to Purkinje cells by parallel fibers, reach the cerebellar nuclei still in parallel. This mystery concerns the superposition of nonlocal long-term potentiation and long-term depression in the conjunctive excitation and selection of the Purkinje cells that will not be silenced, which is equivalent to singling out the servants of Turandot that will not be killed.

At this point, a hypothesis can be made that, *during nonlocal operations, a transitional signal—from the basal ganglia, the inferior olive, or both ensembles—reaches simultaneously the Purkinje cells selected by our understanding and the deep nuclei that will direct our spontaneous moves*. Although Purkinje cells reflect the only known outlet of the cerebellar cortex, the deep cerebellar nuclei are the only known outlet of a cerebellar microcomplex. This situation may explain our difficulty to control at will screaming, moving, and waking up under the oppression of a nightmare. Indeed, we cannot control at will our dreams or the understanding of a joke.

Unlike the curious will for control of Puccini's Turandot, our curiosity for seizing the distributed organization of the human brain must accept the fact that *there is no definite explanation about the circuitry that animates any one of our 5000 cerebellar microcomplexes*. Actually, the deeper we search in the operation of cerebellar microcomplexes, the larger becomes the mystery about how the human brain readjusts classical computing through quantum computing. Ito's comment to me in 2013 that psychology would meet neuroscience in 50 years seems too right!

At present there is no definite answer to the interplay between quantum coherence and decoherence in a synapse, in cerebellar microcomplexes, and in the neural freeway that lies between 25 billion neurons in the cerebral cortex and 100

billion neurons in our cerebellar cortex. Some help, however, may result from hypothesizing that the principles of classical computing in the cerebral cortex and the principles of quantum computing in cerebellar microcomplexes empower each other in the rise of the Third Attention. In breaking through the present stalemate, the act of remembering two episodes of the Gospels may help us lay a bridge between the cerebrum and the cerebellum, between psychology and neuroscience, and between science and mysticism:

a) In the first episode (Matthew 17:3), Moses (or the first attention) and Elijah (or the second attention) accompanied the transfiguration of Jesus (or the Third Attention) on a high mountain; and

b) in the second episode (John 20:27), the principle of Coincidence (by which two objects may share the same space at the same time) allowed the resurrected Jesus to enter the house in which his frightened Apostles had taken refuge, *although the main door was closed*. After that miraculous feat, the principle of Impenetrability (two objects cannot share the same space at the same time) allowed Jesus to guide the hand of the Apostle Thomas into his wound. The disbelieving Thomas had to believe that the spectral Jesus was more amazing than a ghost; and the down-to-earth Jesus, more amazing than a living human being.

The two episodes just reviewed show that the down-to-earth principles that rule the cerebral cortex are no less amazing than the spectral principles that influence cerebellar microcomplexes. Their alliance is also valuable.

Recognizing the reality of the alliance of the principles of classical computing with the principles of quantum computing in long-term depression may help us sublimate global warming, the proliferation of weapons of mass destruction, and terrorism into a new tool for exploring the universe. We can follow Vittorino da Feltre in replacing the pain, the anger, and the curses of the young with blessed wishes, smiles, and joy.

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Antonio Cassella was born in Ethiopia in 1940. He went through high-school education in Italy and Venezuela. He obtained a BSc in Petroleum Engineering from La Universidad del Zulia (LUZ-Maracaibo) in 1965. For the next 17 years Antonio developed new oil fields in the tidal bay of Maracaibo with Creole Petroleum Corporation (a subsidiary of Esso/ExxonMobil), Lagoven SA, and PDVSA (Petróleos de Venezuela). A need to extract hydrogen sulfide from associated gas drove him to work for EPRCO (Exxon Production Research) in Houston in 1976.

Between 1983 and 1993, Cassella worked in Strategic Planning of PDVSA in Caracas. Between 1994 and 1997, he was a visiting scientist at MIT-CEEPR (Massachusetts Institute of Technology-Center for Energy and Environmental Policy Research, Cambridge [MA]). His diurnal research led to the establishment of two scenarios of future global growth of population, energy, and the economy; i.e., until 2060.

In June 1997, his nocturnal research on the psychological roots of autism earned him a master's degree in Psychology and an *Award for Outstanding ALM Thesis in the Area of Natural and Human Sciences* from Harvard University. In 2001 Antonio Cassella received in Caracas a doctoral degree in Sciences of Education from Universidad Nacional Experimental Simón Rodríguez (UNESR).

His writings in Italian, Spanish, and English (*only at Amazon Kindle and Amazon Prime*) show that combining the local certainty sought by our autistic self with the nonlocal doubt sought by our artistic self may help modern society to defuse fanaticism and global warming, while regenerating the Commons of the Earth—among them, the atmosphere and the cycle of water.

Since 2014, Antonio directs the research effort of Research Autism. Research Autism has published in English, Spanish, and Italian 4 books and three series of four documentary-films on autism and the logos heuristics. The first link of the English series is https://youtu.be/rboF8co0ako; the first link of the Spanish series is https://youtu.be/qcWatcCTa-k; and the first link of the Italian series is https://youtu.be/Fzha7fpugaU.

Placing the words "Antonio Cassella" in the space set aside for authors at Amazon Kindle or Amazon Prime, will lead to the list of his books. Antonio can be contacted at researchautism.1@gmail.com for setting up a workshop about the logos heuristics.

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