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Orch OR Memory as “Phonetic Feature Encoding”

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Abstract

Hameroff-Penrose engage Mesgarani linguistics by humanizing a sub-neuronal helical solution for what is “little understood” as “phonetic feature encoding.” Orch OR microtubulin (MT) computation potentiates Watson–Crick 1953 helix information storage as 1957 Bell Lab twistor memory, a system in which many messages pass simultaneously” substantiating concatenation algebras posited by Noam Chomsky as retrieval computation memory drawing choice-determined syntax. Encoding human speech is processed by the same mechanisms as Hameroff’s cytoskeletal Orch OR twistor helices to quantify individual neurons acting as internal microprocessor Bell Lab retrieval switching devices. We submit Orch OR quantum geometry codes are base e Euler in circular polarization to conclude logarithmic spirals by Fibonacci and Bernoulli are “continuum mechanics” configuring Bach-Werckmeister well-tempered scale. This follows semi-tone enharmonics stored in Bandyopadhyay-Penrose-Hameroff Orch OR microtubule 3-D crystalline cylindrical lattices via Fibonacci geometry and gigahertz, megahertz and kilohertz resonances.

Keywords: Mathematical Motivation, Qubit, Twistor Theory, Microtubule, Wave Collapse, Orchestrated Objective Reduction, New Gravity, Enthalpy, Endothermic, Exothermic.

Potential

A humanist grasp of the Queen of Sciences pilots Man past the pending political Dark Age:

We exist as rational humanity in a web of communication that includes our own minds who communicate initially verbally then in writing then electronically through the telephone then the computer thence to the internet progressively amplifying the potentiation of thought. That however there is an evolutionary diminution of our ever-expanding cognition is no surprise. Positively, that cells communicate with each other is evident from neuronal synaptic transfer; that bacterial pathogens communicate to defeat antibiotics is a negative yet provides medical assurance that cognition potential exists in single cell organisms: “The cell as a component of the body is not only a visibly demarcated unit but a unit life centered on itself. It leads its own life” says Sherrington in *What is Life?* Ervin Schrodinger 1944 precedes the quote with “One would think that such a ‘commonwealth of cells’ as each of us is would be the occasion par excellence for mind to exhibit plurality if it were able to do so at all.” Thus in the absence of reasoned governance it is both self-evident and collegial that

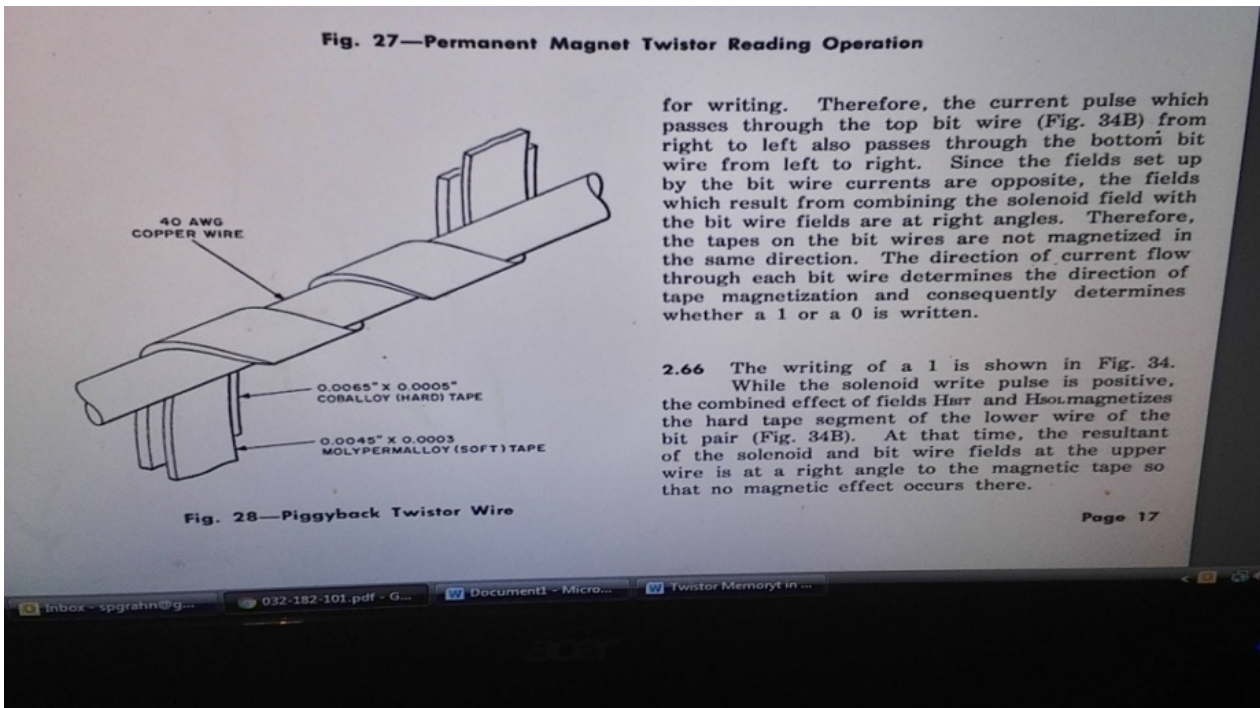
Arts and Humanities be endowed and defended by Maths. See *infra*, Schrodinger 1952 *Science and Humanism* Cambridge Press.

Ervin Schrodinger's 20th Century prose classically objectifies quantum mechanics as mathematically diverse from Newton's era that illuminated universal phenomena attributed to gods and magic as visibly measurable. Objectification significantly alters Newtonian classical mechanics on a sub-visible scale as to be unmeasurable. Newton's take-down of Aristotle and Ptolomy however contributed the parameters which Schrodinger exploded by considering heat loss in Deistic machines as the controlling force of our "commonwealth" universe. The synthesis of Schrodinger and Newton's minds' superseding combined cognition had occurred on the basis of the universal governor, mathematics. Yet, contemporaneous with quantum mechanics, even maths are challenged as inconsistent and incongruous by Kurt Godel. Quantum uncertainty underlies all of cognitive reasoning and shames the 'certainties' of Man's cultural grasp applications studying Humanism as precedential humanity. But unrational is not irrational:

Newton's odious inconsistency pervades Man's reality. Newton led his own life as an alchemist armed with phlogiston ironically which gave way to Michelson-Morley *aether* that Einstein upgraded to space-time, a medium now confirmed by LIGO for "gravitational waves." The spooky substitution of one medium for another recycling the same mathematics justified as Mandelbrot fractals proven by Grothendieck "motivation" infers identities such as circular pi and Euler's base e helix and Fibonacci's sequence operate multi-dimensionally. Yet we will not involve excruciating calculus; we verbalize Schrodinger's quantum chemistry and cosmology.

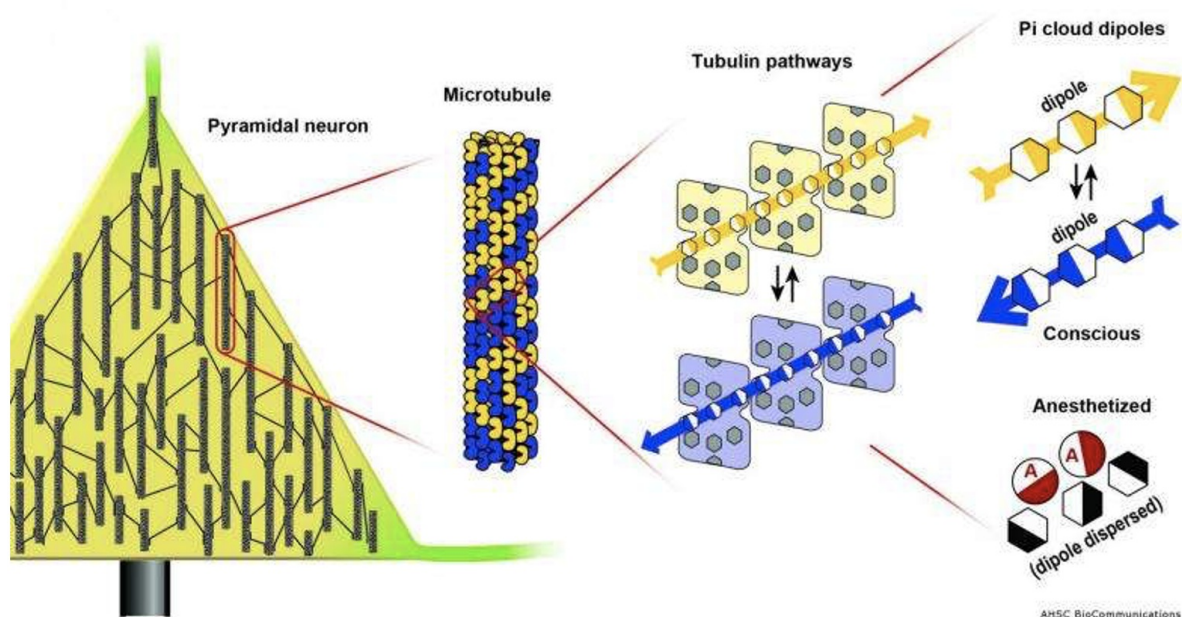
A propos, In addition to *The Bell Telephone Hour* classic television features *Our Mister Sun* and *The Strange Case of the Cosmic Rays*, Bell Systems was the American conglomerate that exerted virtual Dark-Age monopoly over world-wide telecommunications profiting from Alexander Graham Bell's invention of the telephone. From the '50s through the '70s Bell System's R&D division Bell Labs was cutting edge in communications financing Penzias and Wilson's Nobel discovery of the cosmic microwave background radiation proving the Big Bang; Information Theory founder Claud Shannon coined the phrase, 'information bit;' at Bell. Herein we hail the 1957 Bell Labs invention of the "twistor memory" switching devices alluded to eponymously. We attribute Watson-Crick's Nobel discovery of the double helix in genetics as the motivation for the Bell Labs twister switch (that is still in operation today in Paraguay and in some parishes in USA Louisiana) as the vital link between electronics and biology.

Sir Roger Penrose' and Stuart Hameroff, MD's coinage of quantum neuron memory per "orchestrated objective reduction" (Orch OR) utilizes Penrose twistor theory as the architectonic bioinformatics responsible for "piloting" synaptic transfer whereby the neuron expands the on-off light bulb information 'bit' to illuminate like a chandelier scattering 'quantum bits' (qubits). Orch OR phenomenology parallels Watson and Crick's double helix and Bell Lab's pioneering twistor memory. We follow Schrodinger's *Science and Humanism* non-calculus context. We introduce Sir Roger Penrose' equally anthropomorphic cosmology as referenced by him in several eminently readable books consistent with Hawking's 1988 *A Brief History of Time*. We begin orchestrating objective reduction (Orch OR) of Penrose and Hameroff as Watson-Crick similarity to Bell Labs 1957 "Telephone Memory Devices" as precedential potentiation:



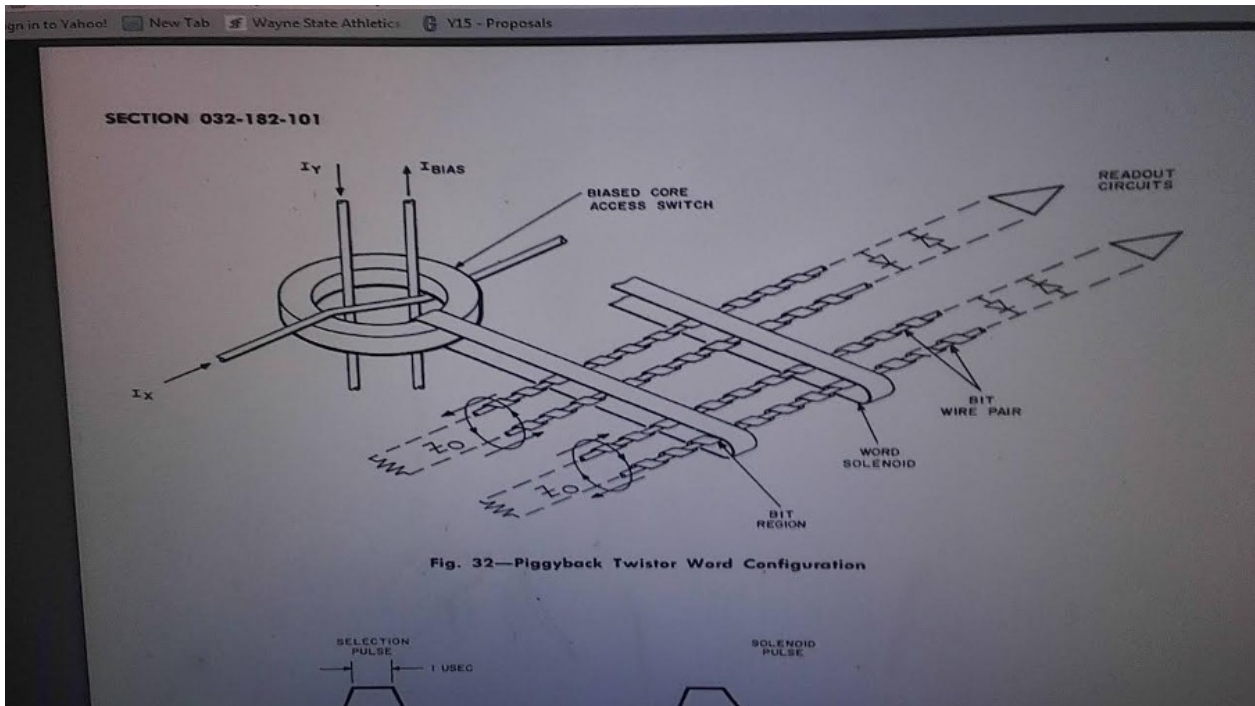
Bell System Practices, 1 November 1968.

Fractal similarity with the Bell Labs device is evident in the microscopic etiology of the neuron cell wall “microtubulin” (MT) suggesting that anesthesia, which selectively erases consciousness while sparing non-conscious brain activities, acts via microtubules in brain neurons. Enter Hameroff, an anesthesiologist who suppresses consciousness in surgical patients. Bandyopadhyay, A, *et al.* (2013) demonstrates that a single brain-neuron-extracted microtubule is a memory-switching element, a random access memory analogue of flash memory switching used in a computer chip:



From left, pyramidal neuron cell body with microtubules, single microtubule, row of three tubulins with aligned pi-resonance dipoles, dipole oscillations and anesthetic dampening. Credit: Stuart Hameroff 2015.

Elucidating concordance with Hameroff's Pi Cloud Dipoles electron cloud London force dipoles suggesting plus and minus electron spins, see below Bell Labs 1965 "Readout Circuits" diagram "in which fields set up by the bit wire current are opposite" per the Tubulin Pathways cartoon schematic duplicating Bell 70-year earlier "Piggyback Twister Word Configuration:"



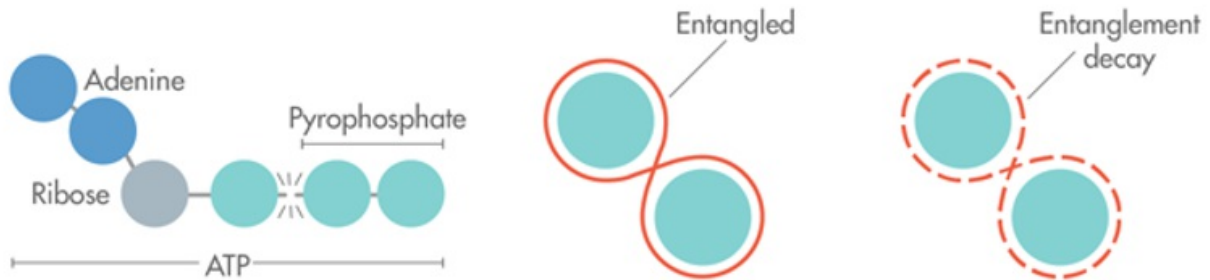
Id., Bell Systems, Fig.32

Noting Pi cloud dipoles in the upper right-hand corner of the Orch OR cartoon twist in opposite directions as also do the "spin" (little circles and arrows) on each "piggyback twister word configuration" synthesizes both representations, though in Orch OR the major differences between current flow in proteins as compared to metallic conductors.

Whereas decoherence in the 'warm, wet and noisy' confines of cellular neurology is the mainstay of Orch OR critics, fractal mimicry, demonstrated by none other than AT&T Bell Labs in 1957 is a chill-dry-quiet "spin" precursor to the above Hameroff Orch OR schematic. Perspicacious as above, a double helix is ubiquitous as in DNA which stands as the unparalleled exemplar for memory storage per Nobel's Watson and Crick. Also interesting is the Orch OR above lower right depiction of "anesthetized dipole dispersion" but for another reason: the nuclear spin, which is a quantum property that affects how long each atom can remain coherent — that is, isolated from its environment. The lower the spin, the less the nucleus interacts with electric and magnetic fields, and the less quickly it decoheres:

QUANTUM BRAINS

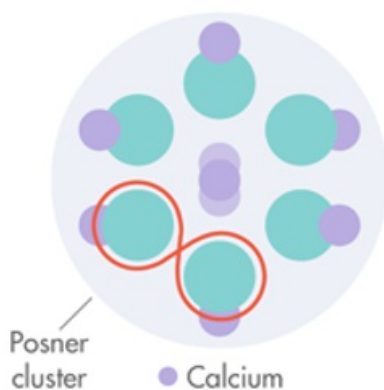
If you want to build a quantum computer, you have to find a way to keep individual quantum bits of information — qubits, for short — linked to one another, or entangled, for sufficiently long periods of time. The task is difficult in the lab. It is thought to be impossible in the warm, wet mess that is the body. But a new proposal details how the brain might maintain quantum connections for seconds, if not hours or days.



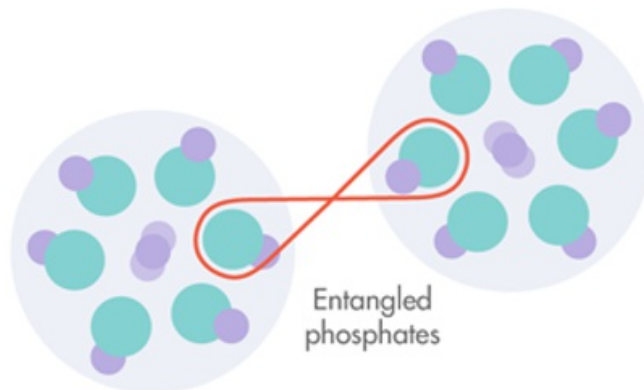
1 The biological molecule adenosine triphosphate (ATP) can release pyrophosphate, made from two phosphate molecules.

2 Each phosphate carries a quantum spin, and the two phosphates can become entangled with each other.

3 Unprotected, the phosphate entanglement will decay, or decohere, in short order.



4 But if the phosphates are grouped together into protective clusters called Posner clusters, which are made of phosphate and calcium ions, the entanglement might survive for a longer time.



5 If a pair of entangled phosphates split into different Posner clusters, they will remain entangled even as the clusters transport them far from each other. In this way, the entanglement can be distributed over fairly long distances in the brain. This allows for the possibility of a quantum basis for brain function.

Fisher, M., Quantum cognition: The possibility of processing with nuclear spins in the brain, *Annals of Physics* 2015 p.593-602 in Oulette, J. A New Spin on the Quantum Brain, *Quanta Magazine*, 11/06/16.

Surprisingly, the simulacrum between dipole-dispersed anesthesia and the spin decay decoherence Dr. Fisher expounds concisely fits the Orch OR quantum bioinformatic model. Moreover 20 years earlier per a paper by Dr. Hameroff, MD in 1998, at Sir Roger Penrose' 65th Birthday convocation: "There is some suggestion that quantum coherence could be involved in MT [microtubulin] computation (Jibu et al., 1994; Hameroff, 1994)." In the Orch OR model, quantum coherent computing occurs in MTs in a pre-conscious mode, and (with isolation) continues until an OR threshold for self-collapse is

reached. The self-collapse (*infra*) **reconfiguring fundamental space-time** (that is, saving information as physical memory)" meets philosophical criteria for a conscious event (Whitehead's 'occasion of experience')." *Id.*

Quantum Coherence Occurs in Bird Brain Navigation?

The analog of Bell twistor memory to Orch OR helix microtubule megahertz sonic storage suggests an intra-neuron "read-out" (*supra*) single-cell capability that encodes sound waves as chemical valances on the tubulin pathway deposited electromagnetically. "Integration of multiple cues" within the brain's superior temporal gyrus servers synaptic communication inherently modulated by an apparent Bell Labs mechanical switching capability. Likewise in Bandyopadhyay, *infra*, the individual neuron operates Bell's readout circuit prosaic in real time as switch telephonic signal destination in Louisiana and Paraguay, *id.*, Bell Labs 1968. Such internally cellular-nuanced neuronal synaptic navigation appears to pilot "complex acoustic speech signal" demonstrating Mesgarani, N., *et al.*, Phonetic Feature Encoding in Human Superior Temporal Gyrus, *Science* 28 February 2014. Orch OR data revelation informs Mesgarani phonetic feature encoding incipient to the Orch OR *ScienceDaily* 2014 paper stating that quantum bits (qubits) form helical pathways in microtubule lattices (Orch OR in 1998) "of these, six are confirmed and none refuted." *Id.*

Per "bird brain navigation" in Myagawa 2012, attributes a species "demarcates predicates with one or more 'arguments' such as combination of calls ... or compass headings set to sun positions in honeybees" as in "waggle dances." *Id.* **Are bird/bee brains as good as GPS cellphones?** The palpable conclusion is thesis-antithesis extrapolated by Bandyopadhyay for bird/bee cytoskeletal MT mitochondria pronounced in Grothendieck's "recurring theme"---Alex Grothendieck, who died in 2014, realized that all cohomology theories were different versions of the same thing: "What Grothendieck observed is that ... no matter how you compute these different cohomology theories, you always somehow find the same answer[.]"—synthesizing what Grothendieck called '*motif*.' Trans-genus exchanges, such as backboneed flounder replication of invertebrate cuttlefish-squid camouflage with photoreceptors *vide* "In Quantum biology, this kind of conductance has been seen for example, for excitons in the light-harvesting systems [Hewitt 2015]." This duplicates as fractal induction that might otherwise to cilia in protozoa having "evolved" from pseudopodic mitochondria. That is, Mesgarani's "poorly understood" STG coding of "phonetic information" synthesizes Myagawa's "'striking parallels between birdsong and human language acquisition (Bolhuis, *et al.*, 2010):" "In music it means a recurring theme... a motive ... coming again and again in different forms, but it's really the same," Cartier, P. in Hartnet, K, Strange Numbers Found in Particle Collisions, *Quanta* 11/15/16.

Penrose' humanistic anthropic posture in *The Emperor's New Mind* 1989 that the Universe may just in fact 'think in maths' (see also his *Consciousness in the Universe: Neuroscience, Quantum Space-Time Geometry and Orch OR Theory*, 2011) has been on-board with Orch OR since the late '80s wherein he and Hameroff posit physiological manifestation of Schrodinger wave collapse. Objective wave reduction recurs in protoplasm media as Fibonacci-motivated ripples caused by exothermic organic enthalpy reactions releasing energy creating eucaryotic intracellular movements. Endothermic reactions rippling internally within the neuron cytoskeleton microtubulin store information as memory. On the vast scale, Roger Penrose and Steven Hawking articulate Black Holes furthering Einstein's cosmologic constant relating information

theory to “negative entropy.” This Schrodinger *What is Life?* concept delivered 5 years after posting his chemical equation advances endothermic information storage internally or flagellar movement externally---both negate the second law of thermodynamics. New memory harvested from ambient nutrients is stored as enthalpy and is not dissipated as entropic heat loss.

These phenomena objectify a motivating repetition between “vast and tiny” (Hawking *A Brief History of Time* Introduction 1988) where pi and helix and Fibonacci recur in sheaves of fractal multi-dimensionality per Grothendieck. As vast, the 2016 Cal Tech Laser Interferometer Gravitational Observatory (LIGO) demonstrates the Einstein prediction that space and time are connected media observable as gravitational memory---tiny protoplasm ripples parallel LIGO BH gravity waves emanating as “soft hair” BH gravitational memory loss (Hawking 2016 “Soft Hair on Black Holes”). That is, relativistic LIGO gravity waves motivating pi and helix and Fibonacci recur in sheaves of fractal multi-dimensional protoplasm ripples motivating Fibonacci-sequenced distortion in *both* cytology and cosmology.

Black Hole gravity conservation of information in Heisenberg-Schrodinger wave collapse objectifies unitarity into negative entropy. Quantum memory in Sabrina Pasterska, *et al.*, *New Gravitational Memories* (2015) is alive as LIGO “soft-hair” opposable Fibonacci-spin wispy space-time perturbations (paradoxically unobtainable optically---BHs emit no light) permanently distort geodesic triangulation of a polar and two planar observers: ***Euler-Fibonacci base e “new gravity” reconfiguration of space-time is the primordial information storage mechanism.***

Accordingly tiny “objective reduction” in mitochondria cilia “orchestrates” helical soft hair wispies driven by surrounding molecular enthalpy transfers explode within cytoskeletal MT. Likewise short-term quantum memory (Fisher 2015 2016) occurs and follows evidence from endothermic ambient photosensitive test tube experiments in MIT’s Bandyopadhyay 2013: electro-magnetic sonic resonance capture and replicate in 2014 for neuronal microtubules. *QED*, endothermic quantum memory recurs as Grothendieck “*motiven*”---LIGO wave-states motivate aggregate protein molecules ***to spawn “new” thesis-antithesis: (a) exothermic mitotic ‘spin’ of protozoans; (b) endothermic orchestrated objective reduction of biological memory.***

Quantum Bioinformatics

Arguing linguistics as mathematic humanism Hameroff-Penrose 2014 updates as LIGO 2016 in anthropomorphic quantum computation. Theoretical tiny models and simulations suggest interaction with neighboring tubulins motivate, propagate and process information as in molecular-level ‘cellular automata’ or ‘spin-glass’ chandelier-type computing systems. *C.f.*, *The Geometric Universe of Roger Penrose* Hugget, *et al.*, 1998.

Mechanically computerized 1957 twistor memory justifying Orch OR 2014 quantum bit vibration MT models is currently regarded upstream reflective of Moore’s Law progression of computation processing speed and effect: twistor memory is core memory formed by wrapping magnetic tape around a current-carrying wire, used in the communications industry between 1968 and the mid-1970s until replaced by RAM chips. Yet new synthesis of the “greater leap” to microprocessor technology in Moore’s Law computer science, the analogue Orch OR Hameroff-Penrose/Bandyopadhyay helical MT

observation in the 1990s “switches” the neuron to surpass microprocessor status in concert with cohort cells via Bell Labs twistor switch linkage. Twistor memory in Penrose-Hameroff/Bandyopadhyay effects control mechanisms in each “commonwealth” neuron that regulate the initiation of MT information and replication, via polymerization and depolymerization, communicating in the brain captured wave propagation.

Twistor memory is the propagation of quantum criticality in life’s protein’s inferring encoding of human speech processed by the same mechanisms as Hameroff’s cytoskeletal Orch OR twistor helices. Individual neurons as internal microprocessor Bell Lab telephonic switching devices communicate with distant-active neurons in quantum computation exceeding binary on-off, though possibly analogous to, switching an on-off light bulb reflecting through a chandelier. In Orch OR London forces in hydrophobic pockets are seen as the switching mechanism to distinguish discrete states for each tubulin in microtubule automata. Thus preserves aural/optic memory for intra-synaptic micro-processing by neurons communicating “infinite” linguistic-mathematic information to form synthesis and new thesis as language-math syntax to extra-neuron MT twistor memory. Quantitative computations of electromagnetic transmissions by neurons endothermic ATP conversion in astrocytes, metabolism of hemoglobin is grossly observable as functional MRI/EEG. Sonic and visible spectra repetitive as memory in MT Orch OR were proven reliable on a mercantile scale by Bell Labs in 1957. Twistor memory, though superseded by subsequent Moore’s Law microprocessor miniaturization, **demonstrates the telephone exchange as fractal reduction of bioinformatic MT helical storage architecture.**

Rhetorically, Bell twistor memory, contemporaneously reviewed by *New Scientist*, explains twistor memory as **sought to replace the telephone switchboard of yore**. No.416 Nov.1964 p.344. That is, at the cellular scale, a twistor memory bio-molecular model may in fact be more viable and in point of fact far supersede current electro-mechanical Intel microprocessor models in efficiency, speed and memory: **Bell twistor memory could enhance quantum computing by pluralizing binary code** replicating Orch OR neurons as switching devices in themselves that contain via cellular automata which substantiate quantum memory. The choices presented by Orch OR informing conscious recognition, internal sensory self-visualization, audition, *etc.* extend to entropy negation via invention. Permutations and combinations of 100 billion neurons synaptic-conferencing shades of meaning as chandeliers focusing photons communicating within a human brain dwarf the world-wide web by googles of factors. Accordingly a “system in which many messages pass simultaneously “substantiates concatenation algebra” (Rosenberg 1951) posited by Noam Chomsky as retrieval computation searching first and second order dictionary definitions for words whose varying usage choice determines syntax.

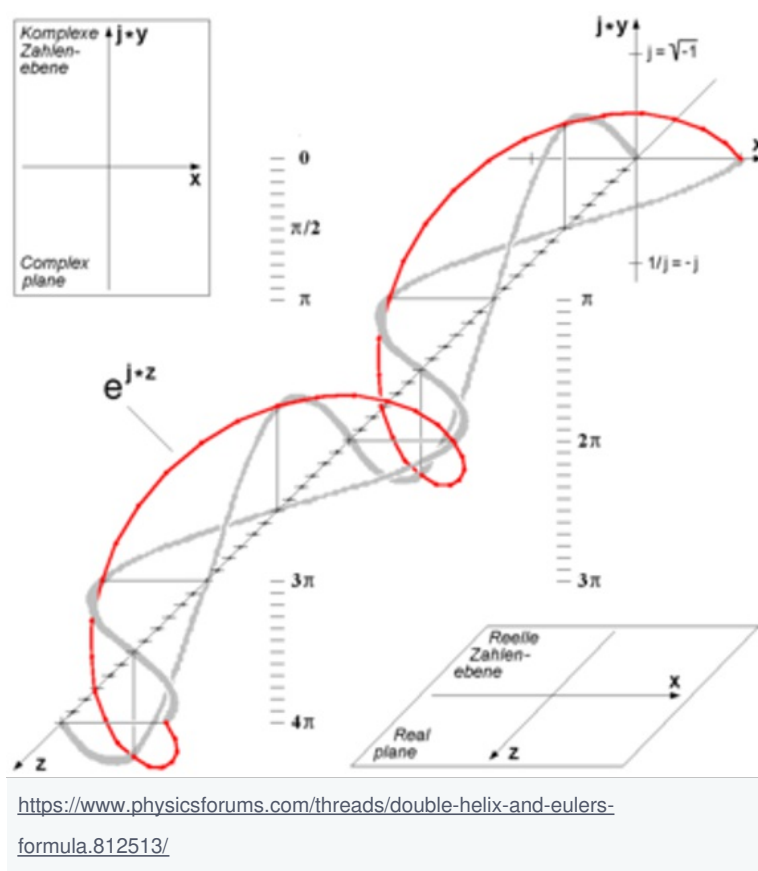
Tiny: Qubits and Noam Chomsky

“Switching” per Rosenberg 1951 in Noam Chomsky’s famous “Chapter 2 Note 6” in 1965*Aspects of the Theory of Syntax* is as an entropic “glider gun” governor motivating change:

“If the grammar is, furthermore, perfectly explicit—... if it does not rely on the intelligence of the understanding reader but rather provides an explicit analysis of his contribution -- we may (somewhat redundantly) call it a

generative grammar.... Thus an essential property of language is that it provides the means for expressing indefinitely many thoughts and for reacting appropriately in an indefinite range of new situations (... cf. Chomsky, 1964)

Id., *Aspects* Note 6. We respectfully suggest circular polarization mathematically provides elegant helical morphology for “choice” rule governance in Robinson 1950 concatenation algebras for an indefinite range of new situations. Chomsky concludes: “Thus, if the rule R(1) introduces the symbol A [“bookcase?”] and R(2) analyzes A, there is an intrinsic order relating R(1) [“book?”] and R(2)[“case?”] Note 6 *Aspects*, *Id.* Accordingly, let R(1) be x-axis; R(2) be y-axis: sinusoidal x-y axes of Euler combined by circular polarity into z-axis ‘spin waves’ intersecting, generating a new vertical spin wave as a *glider gun* in cellular automata terminology, *i.e.*, a pattern with a main part that repeats periodically—a Grothendieck *motif*:



See also Sir Roger's seminal twistor:

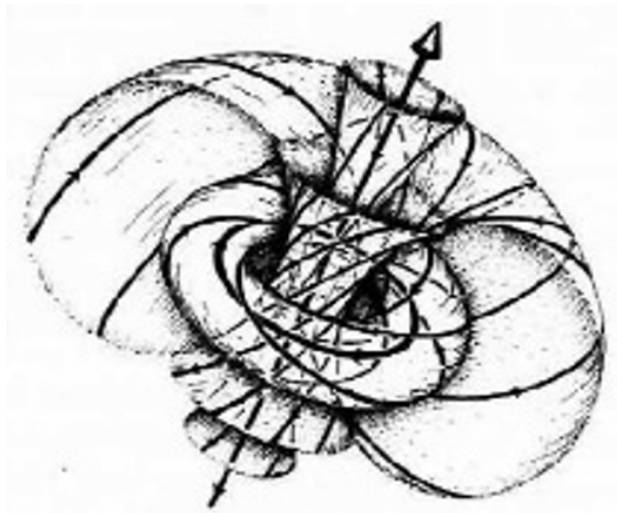


Figure 1. A time-slice ($t=0$) of a Robinson congruence. In Penrose, R., 1987 “On the Origins of Twistor Theory, Gravitation and Geometry.”

Accordingly later:

*The inescapable conclusion seems to be: Mathematicians are not using a knowably sound calculation procedure in order to ascertain mathematical truth. We deduce that mathematical understanding – the means whereby mathematicians arrive at their conclusions with respect to mathematical truth – cannot be reduced to blind calculation. [Roger Penrose. ‘Mathematical intelligence’ In Jean Khalifa, editor, **What is Intelligence?** chapter 5, pages 107–136. Cambridge University Press, 1994.]*

Penrose geometries within the Fibonacci-Euler base e helix confluence focus, as **per Grothendieck**, the “twisting family of linked circles” (*id.*, Penrose). At the core of the “tiny” argument is the Hameroff-Penrose geometry protein helix mechanism demonstrated by Bandyopadhyay recording conductive resonances in single microtubules under an applied alternating current at specific frequencies in gigahertz, megahertz and kilohertz ranges resonating as tiny Fibonacci base e storage-retrieval ‘spin-glass’ chandelier neuronal sequences.

Vast

Quantum memory characterized as Euler’s circular polarity curve is a wave propagation base e natural log function cast onto a vast concrete scale of galactic formation. Below in M51, a relativistic polar ray emanates at its supermassive black hole as a magnetohydrodynamic z -axis of a helix manifesting gamma plasma bi-polar photon ejecta whereas the surrounding planar stellar accretion arms appear as x - y axes informationally frame-dragged by LIGO geodesic gravitational distortion characterized by Pasterska, *et al.* Thus gravity is grasped as information by Pasterska’s doctoral colleagues as a triangle of geodesic distortion, a memory of opposable spin secondary to supernova wave collapse negative entropy coalescing as Fibonacci *motif*.



M51 the "Whirlpool Galaxy". Scale approximately 100,000 light years. "Logarithmic Spirals" *MathImages*, June 2012.

Music of the Spheres

Transposing interpolation being Penrose' "inescapable conclusion" of Mathematical Intelligence consequent to helical function, The Bandyopadhyay 2014 team replicate microtubule vibrations from active neurons via the Sitar and other Indian musical instruments: "Consciousness depends on enharmonic vibrations of microtubules inside neurons, similar to certain kinds of Indian music, but unlike Western music which is harmonic [*id.*]" However, as an anthropomorphic Humanist interpolating enharmonic vibrations as logarithmic base e, Eli Maor's hypothetical conversation between Bach and Bernoulli discusses logarithmic spirals as "well-tempered:"

The harpsichord has a delicate mechanism that allows each string to vibrate only at a specific fundamental frequency. This means that ... to play a piece in D-major instead of C-major---what is known as transposition---then the first interval (from D to E) will have the ratio 10:9 instead of the original 9:8. [But] semitone from E to F and then another semitone from F to F-sharp [is] a ratio of $(16:15) \times (16:15) = 256:225$, an interval that does not exist in the new scale. In short, with the present system of tuning I cannot transpose from one scale to another,

*unless of course I happen to play of those few instruments that have a continuous range of notes, such as the violin or the human voice. [Maor, E. "A Historic Meeting between J.S. Bach and Johann Bernoulli" end-note 1 in e---
The Story of a Number, Princeton Press, 1994 p.131.]*

Nodes of a vibrating string, "continuum mechanics" (Bernoulli in Maor, *id.* at 129) appear likely as Grothendieck *motif* in Hameroff-Penrose 2014 per separate helical crests and troughs further borne out in Maor's proprietary Princeton image in, *id.* at Fig.53: "Twelve notes of the equal-tempered scale arranged along Bernoulli's 1740 logarithmic spiral [at 132]." The vibrating string was the outstanding problem in mathematical physics throughout the eighteenth century. Leading mathematicians of the period contributed to its solution, among them the Bernoulli's, Euler and Bach's organ builder, Werckmeister. The problem was finally solved in 1922 by Joseph Fourier. Maor, *id.* Well-tempered Fibonacci string-theory *motif* is exercised elsewhere:



As well, antiphonally:

Id., *MathImages*, June 2012.

"I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding ... a prettier shell." Sir Isaac Newton.

Quantum Humanistic Progression

To summarize the distinction between conscious activities and non-conscious 'auto-pilot' metabolism and the fact that consciousness can occur in various brain regions, Hameroff 2009 developed the 'conscious pilot' model. As conscious 'grasp' of "commonwealth" in Schrodinger:

“There is always a certain time lag between the views held by learned men and the views held by the general public about the views held by these learned men.” **Science and Humanism** 1952.

Enlightenment and 19th Century science are the underpinnings of the physics of consciousness; and of linguistics as the offspring of music, especially where Menihara’s 2013 paper preambles the discussion of birdsong as rudimentary syntax. Moreover the sensitivity to variation of pitch is an exact measure given in wavelengths of sonic perturbation realizable by evolved auditory ornithology mechanisms relevant to syntax and “phonetic feature encoding” examined as bioinformatic negative entropy, or memory. The evolution of cells walls able to form quantum wave-particles into cellular automata provide concatenations relevant to logarithmic interpolation performed by the conscious mind. Humanistic elevation into Hameroff-Penrose 2014 orchestrated objective reduction (Orch OR), wave-function collapse collateralizes Euler’s sine zenith-trough circular polarization helix organizing ambient potential energy into information transformations in the individual cell. Just so, Euler’s helix extends the flagella-cilia twistor function that pilots protozoa like tiny pistons. Successive exothermic collapse in eukaryotic cell wall cilia linearly concatenates angular momentum propagating helical wave propulsion synthesized the notion that microtubules also process information in an endothermic reaction. The notion was reduced to practice following Watson and Crick’s 1954 double helix by Bell Labs in 1957. Thirty years later Penrose and Hameroff developed models of microtubules as information processing devices, specifically molecular (‘cellular’) automata, self-organizing via post-Euclidean geometries such as a slide rule ‘wormholes’ computation.

Penrose indeed points out “The most important property of [the logarithm] is that it converts multiplication to addition, that is:” the cubic third dimension reduces to linear 2D yet retains 3D exponential complexity. Penrose, 2011 *Cycles of Times* at 20. Hewett suggests the “Einstein–Rosen bridge” is a topological feature of space-time that would fundamentally be a ‘shortcut’ much like a tunnel with two ends each in separate points in space-time. This possibility, much as the LIGO confirmation of gravitational memory, follows as a base e slide rule transforms multiplicative 3-D geometries into 2-D additive logarithmic functions. Hewitt posits wave-collapse-to-particle twistor mechanics wormholes through 3-D biology: “Quantum tunneling (which is an essential process, for example, in the joint special ops of proteins of the respiratory chain) works fine over small distances.” Hameroff-Hewitt, *id.* 2015. Logarithmic spirals in MT Orch OR integrate retention of sound and photo-electric visible spectra wave-collapsed as Bernoulli log-spirals sonically within Bach and Werckmeister’s “well-tempered scale” (*id.* Maor 1994) while natural base e interpolates enharmonic Indian music. Bandyopadhyay 2013. Logarithmic spiraling in Hameroff-Penrose twistor helix mechanic control mechanisms regulates storage of cell wall MT memory. Penrose-Hameroff “envisage microtubules as 3-D crystalline cylindrical lattices with Fibonacci geometry and gigahertz, megahertz and kilohertz resonances [*id.*]” Collaterally, “Matthew Fisher proposed that the nuclear spins of phosphorus atoms could serve as rudimentary qubits in the brain, which would essentially enable the brain to function like a quantum computer.” Ouellette, J. *id.* *Quanta Magazine*. Most conclusively is the overt similarity between Bell Labs Twistor Memory derived from information storage-retrieval capability of the DNA double helix architectonics. Euler-helical Fibonacci-sequenced “switching devices” produce a chandelier-like synaptic scattering of qubits from a singular neuron source to illuminate and communicate consciousness in our “commonwealth” of cells.”

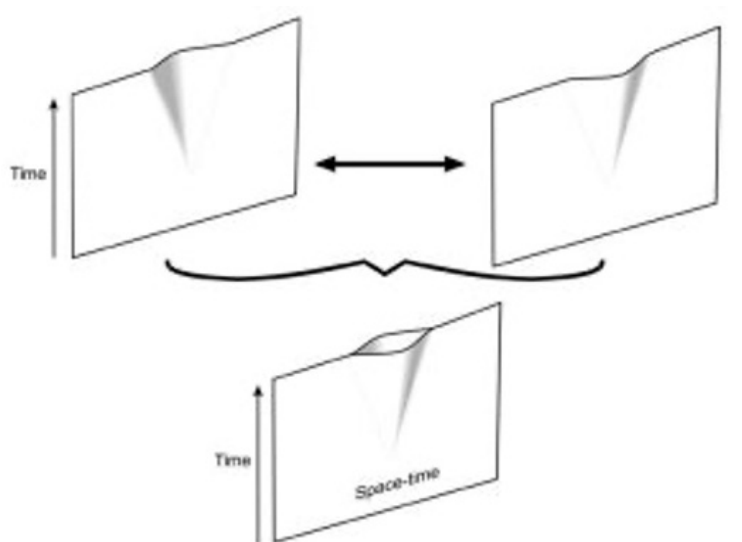
Conclusion

Schrodinger's "aperiodic crystal" (*id.* 1944) co-homology as in Grothendieck applies to the Bell Labs double helix "Twistor Memory" schematic and to Hameroff's "Pi Cloud Dipoles electron cloud London force dipoles suggesting plus and minus electron spins, see Bell Labs "Readout Circuits" diagram *supra* "in which fields set up by the bit wire current are opposite" (*id.* 1965 *supra*) per the Tubulin Pathways cartoon schematic duplicates Bell Labs 70 year-old "Piggyback Twister Word Configuration" (*id.*) as co-homology in "Fisher, M., "Quantum cognition: The possibility of processing with nuclear spins in the brain," *Annals of Physics* 2015 p.593-602QED. Thence co-homology of Orch OR "plus and minus electron spins" duplicates Bell Labs' "Piggyback in which fields set up by the bit wire current are opposite" thus coheres Fisher's 'processing with nuclear spins in the brain.' *Id.* Fisher. **A fortiori, Pasterski et al. 1915 Cornell arxiv.org "New Gravitational Memories" appearing in *Journal of High Energy Physics* December 2016 discusses a "new type of gravitational 'spin memory' [of] beams of clockwise and counterclockwise orbits" *Id.* Moreover, Pasterski, et al, 2016-17 arguably reigns co-homologous with all of the above. *A priori*, the 2015 Pasterski et al. 'novelty' shares propinquity with the LIGO 2015 confirmation of Einstein space-time media. As in Marshall McLuhan's "the medium is the message" (1964) compare:**

*At each observatory, the two-and-a-half-mile (4-km) long L-shaped LIGO interferometer uses laser light split into two beams that travel back and forth down the arms (four-foot diameter tubes kept under a near-perfect vacuum). The beams are used to monitor the distance between mirrors precisely positioned at the ends of the arms. According to Einstein's theory, the distance between the mirrors will change by an infinitesimal amount when a gravitational wave passes by the detector. A change in the lengths of the arms smaller than one-ten-thousandth the diameter of a proton (10^{-19} meter) can be detected. **Emphasis supplied.***

https://youtu.be/tQ_telUb3tE

with:



Then:

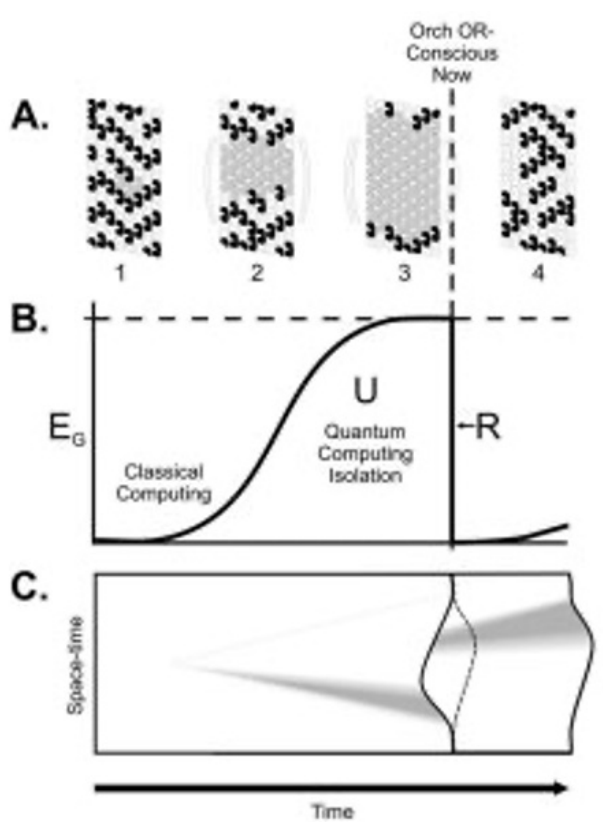


Figure 5. Three descriptions of an **Orch OR** conscious event by $E_G = \hbar/\tau$. A. Microtubule automata. Quantum (gray) tubulins evolve to meet threshold after Step 3, a moment of consciousness occurs and tubulin states are selected. For actual event (e.g. 25 msec), billions of tubulins are required; a small number is used here for illustration. B. Schematic showing U-like evolution until threshold. C. Space-time sheet with superposition separation reaches threshold and selects one reality/spacetime curvature.

In id., Journal of Cosmology 2011, Vol. 4.

When, as for “soft hair” wispy separation in Figure 4 above, we let 4D Time and 2D Line comprise the “Arrow of Time” in the left sheet, then let 1D Point fill 3D Space when the location of a 1D point is indeterminate as Heisenberg: “two alternative spacetime histories....” are seen as a separation in fundamental spacetime geometry” proving as LIGO “change by an infinitesimal amount when a gravitational wave passes by the detector.” *Id.*

Ergo, “New Gravitational Memories” furthers the Orch OR memory medium hypothesis in Penrose-Hameroff 2011 that the Universe “thinks” co-homology the way Galileo, whose 1623 ‘Assay’ almost got him burned at the stake by the Inquisition, asserted: “Philosophy is written in this grand book, the universe, which stands continually open to our gaze. But the book cannot be understood unless one first learns to comprehend the language and read the letters in which it is composed. It

is written in the language of mathematics.” *Sum*.

About The Author

Richard H. Goranowski, a graduate of Wayne State University, did post-grad at UNC-Charlotte and Northeastern, published three articles in Common Ground journals; wrote U.S. Pat. No. 6,707,447 *pro se*; and in 2017 named an educational consultant for EDUStaff LLC, Michigan.

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