AFSCET

Res-Systemica

Revue Française de Systémique

Fondée par Evelyne Andreewsky

Volume 23, printemps 2022

Systémique quantique

Res-Systemica, volume 23, article 05

Societal structural patterns & individual agency: the inevitability of quantum integration?

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10 pages

contribution reçue le 28 juin 2022

Societal Structural Patterns & Individual Agency: *The inevitability of quantum integration?*

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Key-words

Systemic society — quantum society — consciousness — societal invariants.

Abstract

After a brief description of the dominant design of a traditional society, we show the intrinsic limits towards which it leads. We then discuss a set of quantum phenomena, already validated on the micro-macro axis by several international physicists, which can be used as a basis for a new societal worldview. We would show the intrinsic limits towards which it leads and the opportunities to get past them through this enlarged vision. Our recent research on the updating of national and other constitutions is used as an illustration and a point of support which links to a process that enables, through methodology integrating a systemic dimension, a harmonious transfiguration of Values, Principles and Rules of application, notably constitutional, in the light of present and future socio-political and eco-planetary realities and challenges.

I - Does society remain Newtonian?

« I fear knowledge of my exact limits. » René Magritte.

I.1. The civilization has already been transformed

The seminal invention of the expression 'paradigm shift' by Thomas Kuhn [Kuhn, 1962] finds a timely illustration with the civilizational evolution observed over the past few centuries. No less than three phases, boasting all too distinctive characteristics, underpinned three successive paradigms.

From the 17th up to the 19th Century, mechanical machines were supporting a linear development of societies based on *force power,* basically the ruling through physical force. Mid of nineteen century, horse power gave way to the steam engine and signed up the *First* modern times paradigm under the notable contemporary development of thermodynamics — the relation of heat to physical forces.

Despite Newton inspiring a 1905 Einstein by saying, *« light is small grains »*, classical mechanics didn't tackle new advances in physics, notably magnetism, spectrum analysis, superconducting, or the photoelectric effect to name a few modern principles, the latter ones being newly founded on quantum physics. Hamilton too, around 1850 sensed the quanta nature of energy. Since Planck established his quanta formula in 1900 (with, *inter alia,* the photoelectric effect, the Compton effect, and the existence of the spin), a radically novel and combined view of space and time arose whereby the full knowledge of initial conditions of systems was declared impossible (Einstein). The notion of chance was back, discarding Leucippe and Democritus paradigms, installing the domination of probabilistic events and triggering deep puzzlement among the leading scientists. Einstein's authoritative appreciation, *« A theory is the more impressive the greater the simplicity of its premises is, the more different kinds of things it relates, and the more extended is its area of applicability. Therefore the deep impression which classical thermodynamics made upon me. It is the only physical theory of universal content concerning which I am convinced that within the framework of the applicability of its basic concepts, it will never be overthrown »* [Hawking, 2007], anticipated and accompanied an enduring bafflement opposing classical and quantum physicists for another half a century…

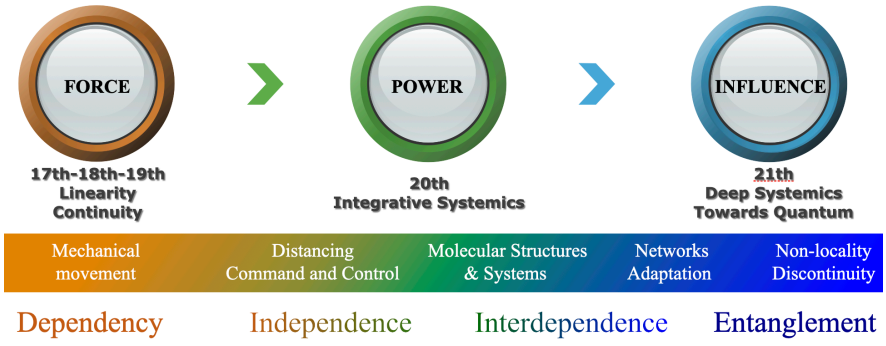

Figure 1. *Over a few centuries, three phases manifesting three successive societal paradigms.*

Notwithstanding, by the time the first quarter of the 20st Century had passed, all was in place for a fresh quantum-based territory in the face of classical mechanics — just when a young and frantic Heisenberg exclaimed, *"there comes a time when you have to jump into the void. »*

And yet, the 20th Century mostly exacerbated command and control apparatus, then structures and *power systems* towards technological domination by integrative systemics, particularly through powerful multinationals and supranational organizations. Search for control may seem a valid word summarizing the past century quest - the *Second* paradigm of modern times (cf. Figure 1).

But came that foundational [Aspect & al., 1982] optical experimental verification at Orsay of non-local influence between particles after any of their previous interaction, that could also pave a step forward to extending quantum phenomena towards macroscale. Worthily, in biological structures at molecular, cellular, organismic, and species levels. Research showed [Grinberg-Zylberbaum & al., 1994] that correlations between human brains happen in pairs of interacting human brains. An evoked potential is manifested in *« non stimulated subject showing "transferred potentials" similar to those evoked in the stimulated subject »,* thus indicating *« brain-to-brain non-local EPR correlation between brains, supporting the brain's quantum nature at the macrolevel »* (cited by [Goswami, 1999]).

Indeed, Aspect's & al. fundamental result irrevocably refuted the long-standing Einstein-Podolsky-Rosen (EPR) Paradox [Einstein & al., 1935], finally confirming the possibility of non-locality, a fundamental quantum property along with entanglement and non discontinuity. The same authors simultaneously suggested that *« the brain obeys a nonlinear Schrödinger equation in order to include self-reference »,* who conjectured, *« It is possible that for systems obeying nonlinear Schrödinger equations, message transfer via EPR correlation is permissible. »* [Id.]

In parallel, by the latter decade of the 20th century, a massive Internet usage generated by networked computers, wide electronic and informatics networks, and the World Wide Web shifted gear and initiated a deep wave of information-based *influence power* throughout humanity, calling for continuous adaptation and evolution — signing a *Third* paradigmatic wave of modern times.

The above consolidated advances implicitly open the way to subjecting entire organizations to such laws, where humans operate under common objectives supported by any grouping of humans, associations or firms being examplar instances. Teilhard de Chardin sensed such evolutionary process who dubbed it 'socialization', *« a somewhat inevitable process »* [Giron, 2015] by showing a scaled up degree of complexity (cf. Figure 2).

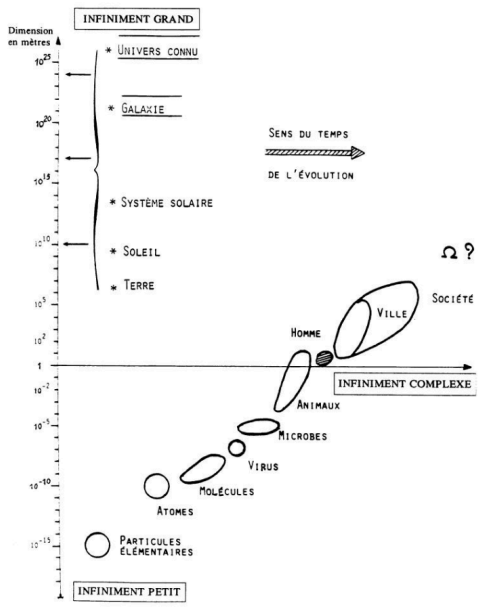

Figure 2. *Where a Teilhard de Chardin's schema qualifies cities and society within a growing evolutionary complexity towards an 'Omega' point.* From [Giron, 2015].

As a result of the massive spread of intricate networks and feedback loops, any society in the more developed world has undergone increasing organizational complexity levels over the last decades. Myriads of luminaries — Edgar Morin, Joël de Rosnay Jay William Asby, Gregory Bateson, Ludwig von Bertalanffy, Norbert Wiener, Paul Watzlawick, Wright Forrester and many others — have stated that the deeper the societal systems are, a higher level of societal complexity is required.

[Bar-Yam, 1999] introduced two concepts for installing a post-modern world in transition from human beings behavior to human civilization. Namely, *complexity profile,* the amount of information necessary to describe a system as a function of the level of detail provided, and *scale of observation,* the level of detail visible to an observer of the system, thus pointing back at Teilhard's representation. For him, *"the history of civilization can be characterized through the progressive (though non-monotonic) appearance of collective behaviors of larger groups of human beings of greater complexity."* [Id.] He asserted the complexity of challenges humans can collectively overcome goes on a par with the complexity of a system's behavior, in particular the social and economic contexts.

Today, a plethora of scientists having own dynamics and interrelations pursue the moving quest unabated, whereby deeper systemics at work in the ever more complex fabric of society gradually get percolated by quantum science from very bottom particles up, and towards macro structures (back to Figure 1).

I.2. The dominant designs of traditional societies

Fact is, however, that the foundational legacy of societies still abides with a dominant Newtonian worldview, and Bar-Yam 's societal manageability hiatus is gradually leading to issues that have become highly intractable rationally, such as the present grand challenges of ecological, socio-economical, geopolitical, sanitary, cultural, digital, etc. natures. The generating factors seem to reside in society's traditional dominant elements, which show three critical shortcomings:

1. A causal fatalism of single-mindedness (aka the *« pensée unique »)* that reduces, confines, and renders backtracking impossible in such constrained mindsets. Whenever systems favor unicity, they lower their resilience, indulging into brittleness.

2. A hyper-massive, ubiquitous information overload that trivializes *meaning* overall by generating diminishing meaning returns. Pushed towards absolute limits, information becomes merely white ambient noise. This applies to data and knowledge, the raw power resource of an information-based society.

3. Reductive traditional hierarchies, compositing the canonical form of management, can lead to *divisional blindness.* As society entrenches itself into categorical mindsets through monolithic organizations, political dogmas, beliefs factions, or fundamentalist communities, it gets prone to conflicts among constituents and maintains fixating dichotomies.

In recent investigation, [Goerner & al., 2009; Ulanowicz & al., 2010] showed that a societal system must actually balance two core properties: efficiency, defined as effective performance, and resilience, defined as robustness to resist and adapt to changes (cf. Figure 3). Their research showed how systemically important society is, plumbed by a dilemma: *sustainability* or *system instability,* that is a lack of balance in emphasis between efficiency and resilience. But policy alterations happen only marginally and the aftermath of a 2007 subprimes myopia from risks did lead to devastating financial crisis.

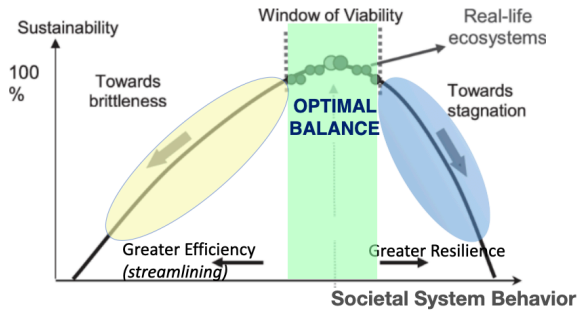

Figure 3. *A societal system requires balancing efficiency with resilience.*

In addition, those researchers showed that the sustainability of any complex flow system can be measured with a single metric as an emergent property of its structural diversity and interconnectivity. That, like any complex system, an organized societal system should instead *combine-and-balance* its efficiency and its resilience together. However, the seek balance still does not walk societal evolution full circle, if only from amendments, conflicts, or controversies, to revolutions and other societal jumps. This paper provides an extended view.

Added to this dominant thinking, a hopeful macroscopic continuity, the deterministic confinement of future plans, foresights, and scenarios projections are ordinarily seek, even imposed and made both arguable and palatable. Connect to this the growing 'hyperbolization' of resources whereby ever more production means are needed to extract less raw resources, ever more wealth accruing to wealthier ever people, and vice versa ever more people accessing less and less resources. This happening, despite the bedrock « Limits to Growth » alert of the Club of Rome [COR, 70; Meadows & al., 1972] and its several updates, among which [Meadows & al., 2004; Corsi, 2017; Bardi & al., 2022]. Plus the growing downgrading of the « human resource » leaving to ever more intelligent machines, and the supra-state organizations compressing national statuses, despite the recognized criticality of employing diverse and efficient resources overall. A gloomy picture populates the 20th century aftermath, perceivably cast for developed societies soon stumbling into the wall of unworkability. The stage is set for an exhausted post-Cartesian, post-Newtonian vision calling for a new one.

I.3. The Newtonian properties of societies

The above discussion directly translates into a series of Newtonian properties for societies:

- **Locality in space-time:** a national sovereign state is a definite territory, armed with values, principles, legislation, means, and hopeful raw resources. Whatever was born in time-space thinks, strives and defends itself in such bounded capacity, returning Einstein's famous quote, *"Time and space are modes in which we think, not conditions in which we live. »*
- **Direct causality:** initial causes are enacted to impact through an effect. While e.g. constitutions are elaborated with implicit or explicit finality, the double causal interplay of initial-final causes is neither activated nor balanced.
- **Deterministic continuities:** laws and regulations typically tend adding up and sedimenting over time, challenging the making of coherent simplifications and backtracks. The deterministically perceived arrow of time seems to prevent an active looking back for restoring the capacity to sustain efficiency and resilience.
- **Simple hierarchies:** organizations of all kinds are customarily decomposed into simple elements, which stifles global meaning and evolutionary patterns. Constitutional processes are often proposed with rigid, fixed knowledge structures that limit their overall evolution.

This amalgamation shows the quite reductive societal explanatory capacity of classical mechanics since it works with absolute time, most depends on a given initial state of the system (initial conditions at time t), works by elaboration of hierarchical reactive (not anticipatory) behavior, finally rends things determined. Plus, the binary confinements like political antagonisms, carry more narrowing divisions than open futures. Yet, societies demand change, sometimes by bold measures. Who could be in charge then, should a citizen be exclusively at the service of the state or the state be at the service of the citizen, or perhaps together synchronically and not representatively?

I.4. The limits to traditional societies

Intrinsic limits within the above dominant reductive designs have been reached and they pertain to a human condition, to the link between reality and rigid representations by people's brains: brains do represent their world from accrued memories and the possible projections into the future. They tend to not distinguish between reality and imagination. Actually, brains live in a reality that brains have created. It is the rigidity of these representations that creates past dominant paradigms and a new meaning becomes necessary with a view to opening possible evolution steps.

It appears all too easy to oppose the promising wonders of an unstoppable technology (quantum computing, stronger AI, intelligent robotics, advanced genetics, etc.). In contemporary computing devices for instance, a successful Turing's test prevalently populates our daily usages, by which we *perceive* the « intelligence » of our machines. At this point, philosopher John Searle's point is well to remember *« The computer never has to deal with meanings. »* [Searle, 1992] Computers churn and display alphanumeric characters, which we perceive as even moving images, yet never have to understand - this is the point. Out of persistent outspoken debate, Roger Penrose deepened Searle's proof [Hameroff & al., 1998]. In order to process meaning, mind is indispensable, which an inanimate capacity based on algorithmic means just can't meet, as can't create self awareness.

Meaning being a distinctive human ability to put memory-presented and new elements in hindsight, in perspective. Where the role of consciousness, itself including a non material agency because not a mere 'reportability' mechanism [Chalmers, 2010, p. 29], is to understand the meaning. *« We know that a theory of consciousness requires the addition of something fundamental to our ontology, as everything in physical theory is compatible with the absence of consciousness. »* [Id., p.17] Making meaning is quantum: from a superposition of possibilities, the observer collapses them into a reality — brain binding. This paper overall aims at enhancing the value of meaning at societal level.

Gigand [2010] acutely elicited the three fundamental invariants which operate both as limiters of perception — the perception of reality — and can be used as triggers for further exploration by the mind. He asserted that the overall 3-fold limit is *"caused by the incompleteness of perception, which will always be three times partial, partial-in deficit, partial-biased by self-reference, and partial-fragmented by indeterminacy"* [Lambert & Gigand][1]. Hence the three ontological limits inherent to the human condition. Taking stock, considering a given society as an observable object, we inescapably stumble upon three forms of *invariant limitations* having three forms of partiality, each impacting the individual and the societal reference system in which a person is aware of being, observing, acting as a social agent. More precisely, these three forms are:

- **Partiality 1: Self-reference.** Here we have a skewed sense of meaning, a sort of Kant-biased meaning. Self-referentiality projects concepts into ad hoc societal bodies like institutions or any collective organization, under a governance that controls what society can do. Resorting to partial experience as a fallback position, people tend to fall into self-referential views, even exacerbating variable doses of mental and behavioral irrationality. M. C. Escher was notably famous for drawing self-referential the system as trapping matrices (e.g. « The Three Spheres II, 1946; « Drawing hands », 1948) [Escher Foundation, 1968]. This first limit poses the link problem: what is the communication link between the present and the future since there can be no material link? Here, individuals question the domain of validity, a space-time decision requiring effort.
- **Partiality 2: Incompleteness.** Allowing societal resilience is a legitimate intention that however stumbles into the lack of rules. Gödel truthfully demonstrated that any axiomatic formulation of a consistent arithmetic theory contains undecidable propositions. In an approximate nutshell, any closed coherent system is incomplete. Russel & Whitehead had shown this condition of things in their Principia Mathematica [Whitehead & al., 1910; STANFORD, 1996] within fixed systems of propositions. Here however, an individual would question the field of intelligibility — a resource.
- **Partiality 3: Indeterminacy.** A fragmented, partial understanding straightly recalls Heisenberg's principle dealing with fragmented understanding, overcoming dualities and antagonisms distinct from uncertainty. In the making of constitutions for instance, the indeterminacy is to make an evolutionary selection of appropriate principles and values at the appropriate time. Yet, macroscopic indeterminacy appears in the guise of events de-correlated from an observable cause. The identification of their determining factors calls for possible *a priori* non-causal correlations (ex. why a continuous rain here and an unalterable drought there). Here, an individual would question where its degree of resolution did stop, requiring due attention.

In fictional literature, Isaac Asimov early anticipated [Asimov, 1950] the essence of what could be a complete generic order when applied to the category of robots through his « three laws. » But in mundane contexts, can the above three ontological and invariant limits of any human environment be practically overcome? These limitations, when put on knowledge, thought, and action in overly complex situations, make future paths less visible, revealing situational incompleteness with plurality of blind spots.

We *de facto* obtain a ternary referential for study that enables to exist « as another » and offers a qualitative leap. A social agent, being conscious of being, observing, and acting, expresses the three said limits through the following three constituting facets (cf. Figure 4):

- *postural,* through an attitude combining self-reference and indetermination,
- *actionable,* by according self-reference with incompleteness,
- *dynamic,* through adapting indetermination with incompleteness.

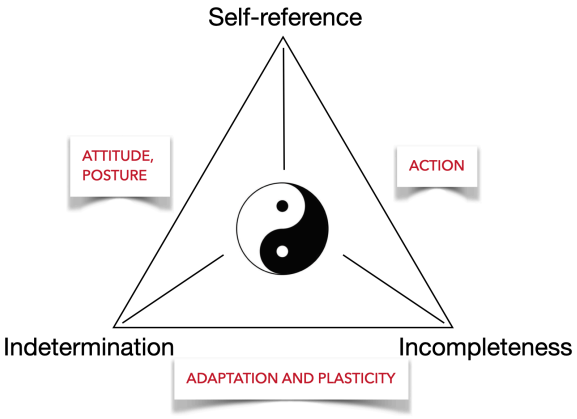

Figure 4. *The three ontological limits of perception and their pairings. Combined together, they denote an observer conscious to observe, an « appraiser. »*

Could this assignment be amenable to quantum interpretation? By considering that an agent's consciousness is to perform that triple jump, we will show how the leaps set the basic properties assemblage for a quantum society (similar composition had been shown earlier in the education context [Corsi, 2022]). For this, another referential will be necessary to express the quantum nature in society and it will be brought through what we call invariants.

[1] Note the French language discriminates the three notions each with respective adjectives *partial, partiel,* and *parcellaire.*

II - Quid a quantum society?

« Le jour, c'est la vie des êtres, mais la nuit, c'est la vie des choses. »
Alphonse Daudet, Lettres de mon moulin (1866).

II.1. What about societal non-locality?

For a moment, let's see social individual agents as chameleon agents within their reference population, perhaps quantum particles or wavy channels. [Feynman, 1982] showed that material interactions cannot simulate non-locality. We indeed first perceive society as an orderly construct in space-time, animated by matter and motion. Society obeys cause and effect relations (Newtonian view), but does it own conscious purpose? It grows its order further to maintain itself through evolution. Is there purposeful evolution? Actually, some societal non-locality already appears for instance in the service to others, like voluntary work, bringing around goodness, just and truthful engagement. Here, the parameters attached to social manifestation no longer bear precise values, we witness this for instance in traditional accounting measures.

As citizens look at themselves and society with recall, naturally via works and experience, the individual consciousness is both the looker and the looked at. Human consciousness is not a *(epi)genetic* evolution and as humanoid species long lived in communities small or large, homo sapiens gave rise to cultures and social practices in the likes of rituals, arts, myths, religions, leading to growing a collective archetypal unconscious [Jung, 1981]. Thus, social consciousness in humans splits itself into two parts: the subject (itself) looking at the object (society). Consciousness isn't amenable to a simple object resulting form a physical mechanism: it is both the observer and what is observed, one definitive Gordian quantum knot.

Now, take these « objects »: the citizens and all manifested social constructs like formal bodies, laws, regulations, etc. One can phenomenally consider them as corpuscles when measured through determined social actions inducing materialization. Yet, also as possibilities when contemplated in their generality or potentiality. In the second mode of perception, possibilistic waves interact locally and the same objects express non-locality. Non-locality appears when developing this bi-modal social consciousness.

Such conscious measure directly evokes the so-called measurement problem (i.e. whether a wave function collapse occurs) long analyzed by no less that John von Neumann, who invoked consciousness to collapse a wave function within the brain. Hence, that material interactions alone cannot conversely convert a possibility into reality — a non-material agency being required. This argument he initiated in the 1930s has been comprehensively studied since by followers (for a wrap-up see e.g. [Stanford, 2004]).

II.2. A macroscopic thought experiment: the voting paradox

In society, people generally behave as separated and independent objects, and their feelings are centered on their immediate personal concerns and the ego, that is, proceed according to Newtonian physics. Ken Wilber developed the view that each one behaves as a center of gravity [Helfrich, 2007] within the whole. In the case of general democratic elections however, as well as in community celebrations (church or pagan) or even the (re-)framing of a constitution (Chile being an on-going national case), or when crises suddenly erupt, a unique center manifests, potentially correlating the present citizens or participants. These individuals are then experiencing entangled hierarchies, perhaps partisan, breaking from the continuity of the day-to-day routine. And the bonding sesame to be able to reach the experiential non-local expansiveness is the civic rights pass, which bestows the somewhat tribal sort of *esprit-de-clan,* a critical feeling of belonging. Civic rights passes (precisely passport or identity card) correlate individuals with the distinct citizen status. Probably not inducing actual unity, yet *a priori* granting the phenomenon of quantum properties. To put it simply, free election is quantum freedom.

We will therefore apply von Neumann's ascendancy to the case of a generic societal representative process such as a democratic election. There, a given candidate Cj (Cj $\in$ **C**, the list of all eligible candidates) running for general election is being observed in a superposition of possibilities (e.g. elected, refuted, pending balloting), through the state vector superposition $|Aj\rangle$ within an orthonormal basis (N voting electors form the N-dimensional space):

$$|Aj\rangle = \Sigma i\ \alpha i$$

$|i\rangle$ with $|i\rangle$, i= 1, ..., N, αi are the components and
i = one voter among N voting citizens

Candidate Cj is therefore in accumulated « Schrödinger's cat » state, whereby the $|A\rangle$ state vector representation transcends simple causality and will collapse the voting experience dynamics by tapping on the voters' non-local consciousness and its possibilities (each actual voter's choice among all candidates Cj).

Figure 5. *Visualizing* a*n election ballot box as a black box of votes manifested in conscience, not yet as citizens votes objects.*

In this thought experiment, let's consider just two eligible citizens named Alice and Bob who, while observing, analyze society and intend to vote simultaneously for electing one candidate among the plurality of **C** possibi-

lities. Casting their vote is an individual collapse act of their individual consciousness into actualizing their own respective choice, even while there is no tangible reality yet cast overall, as the result from the election voting-process is still kept unknown, in particular to themselves.

The question is: at this very moment whose choice counts? The evident answer is that it is impossible to discern an overall resulting preference, this will have to wait the closing choice of all other voters. In other terms, the compounded societal wave of possibilities remains outside of space-time, i.e. only a potentiality.

Yet, causal agents Alice and Bob offered, via their feelings and thoughts about the societal meaning of that specific election, an instant-correlated communication by activating two « I, Alice voted », « I, Bob voted » conscious subject experiences. Consciousness voted and without order. Which denotes two separate quantum movements whereby they, conscious subjects, acting as conscious brains, looked at/related to specific objects, the candidates, in space-time.

A macro description of an election process

Let's now suppose votes are each a radioactive atom and that each vote triggers an atom decay, so you could register the voting act through the ticking of a Geiger counter. In the vein of Schrödinger's cat paradox, suppose an overall fatal mechanism triggers when observing that the aggregated voting count reached the majority of votes at election close (votes are only materialized when the count box gets opened). Figure 5 shows such a ballot box at any time t *before* opening, that is as a black box.

The coherent superposition of all states $|Aj\rangle$ from the various macro distinguishable eligible candidates Cj get collapsed by the collective consciousness of society. This creates societal *self-reference* as society sees/observes itself in its own mirror: it is the composed tangled hierarchy in the voting system which creates self-reference.

Yet, the set of eligible electors forms an irreducible whole. The choosing societal consciousness is the same one backing all voters, who themselves tap into the societal unconscious and make a new global space-time reality consciously. Quantum physics principles can explain the non material part of the process: the detection/measurement/recording of the actual value of a single vote is a *particle* phenomenon, while the summed up votes is a societal interference, that is a *wave* phenomenon, hence the quantum duality or better complementarity. The resulting vote is a quantum measurement event, non-local, discontinuous, with tangled hierarchy. A downward causation has manifested.

Disentangling the *gedanken* experiment

Before the election session, all voters are in quantum state and they are called by their affiliation institution to become *agents of causation*. Note that the calling institution too is agent of causation of opinions that can be expressed in votes. During the vote, one vote is like one potential (non manifested) Geiger detection. With all voting citizen Ai (again, i = one voter among N million adult citizens), the resulting societal photograph in space-time is summed up by superimposing the i votes each on time Ti (cf. Figure 6).

Using now for convenience the atomic clock, each vote can actually be tagged with an *own separate* time tag. Because it assures, given that its resolution is a sure inferior bound (1/9192631770 s) for the whole Earth population, that there always exists a positive Ti+1 - Ti interval between any two time-adjacent voters Ai and Ai+1). The expressed votes, minus the blank and null votes, are then counted as valid measurements. They have materialized the quantum state of the society at election date. Abstentions consistently remain in potentiality, in a non manifested state where nobody will ever perceive, therefore know, what could these vote have been, they do not own an history, escape brain memory and reasoning!

Figure 6. *Trapping the ballot black box in random detection by means of some quantum counting device.*

Voters' consciousness make their own experience « speak » through their brains through conscious choice. In doing so, they make social consciousness bring oneness potentiality into actuality — *e pluribus Unum.* Now extend this to genuine decision-making. Here lurks the paradox of perception whereby society is bound to a quantum physics-based agency in everyday acts, all so due of the agency of consciousness.

To include the case of time-lagged overseas territories also brings an interesting complement. Due to distant time zones, some locations around the world may vote say either the previous (resp. the next) day. There, the remote (resp. local) results are reputed known before closing the election if made publicly known. Therefore, anticipated results can manifestly bias the local (resp. remote) voting. Given the time lapse, this amounts to a feedback from a memory and introduces a non-linearity in the currently ongoing voting phase. Which suggests a traveling phase lapse in the overall societal election wave which, in connected societies, *de facto* interferes with the ongoing voting process. It may produce « walking votes » which condition in a Newtonian way, even if marginally, the follow-on.

More fabulous electoral vaticinations

The above discussion notionally echoes a 1801 double slit experiment [Young, 1807] and its endless variations since. John Wheeler's renowned quote, *« no phenomenon is a phenomenon until it is an observed phenomenon »* lead to the remarkable notion of delayed choice [Wheleer, 1978]. The revealing the voted information *after* the actual single vote into a ballot box is like when an isolated

and unnamed particle is observed passed Young's box slit: it similarly either potentially changes the voting observation or creates an interference in the election… Note that here are as many slits as ballot boxes. This confirms the view that votes in the many physical or electronic ballot boxes actually have no location until they're measured[2]. Would this constitute an argument favoring electronic voting? After all, measuring calls for information memory. Heisenberg indeterminacy principle says that observing particles inevitably disturbs the process enough to destroy the wave interference pattern.

Out of curiosity, physicists have even invented a quantum eraser ([Scully & al., 1982], first experimented by [Kim & al., 1999]), by which the wave behavior — the unknowingness of votes in anonymous voting session — can be restored by editing out or making permanently unavailable the "which path" (i.e. which vote) information, thus killing history! However, this would require *entangled* votes, as if being for instance perfectly simultaneous, aka « twin » votes, one neither before or after the other.

Note that in such quantum erasing the vote appears to be cast *after* voter did vote, so you appear to change the vote! By accepting which-vote or both-votes information, a given vote can be eared or marked through a mechanical entanglement process. This would be leading to reinventing democratic elections by « seeing » cast votes outside the ballot box, somewhere they normally shouldn't be manifestable… Which would lead to imaging democratic « cloud-based ghost signals » before they be found manifested into reality,. Don't classical polls conspicuously do better in leaking intentions?

And importantly, much less than peculiar to particles only, the legacy double slit experiment was performed with many recent and macroscopic variations involving not just particles but molecules, even hydrodynamic analogs [Wikipedia]. Leading to possibly invent a quantum macroscopic votes counter?

III - Which transforming elements?

« Perception and reality are two different things. »
Tom Cruise.

III.1. Behind the perceptive estate

In the aftermath of societal acts, including the one of democratic election, society get customarily perceived as Newtonian, yet with a non physical pinch of quantum salt as we've seen in previous section. The phrasing *« We, the People… »* signified at the exit of the American constitutional process makes up this pinch. It is because a sense of self-identity was raised during e.g. election time which perdures for some while. Perhaps should we call for an *integrative society* that integrates cognitive processes with quantum aspects. Society boasts two selves:

- an ego-self that manifests as actualities, purported by media and narrated through history,
- a quantum-self that remains into potentiality and requires actualization through individual brains.

The first self takes the dominant estate while the second is non-local and acts through discontinuity: a subject, object, and consciousness trilogy. Sensibly, Newton's physics rule, but only in sufficient approximation in the matter-based macro-world. The causal world of consciousness is joined to the gross world of matter (makes representations) through a more subtle world connecting the two. The discontinuity between the two worlds appears as a creative act, through accessing potential choices consciously and reversing standard causality, manifesting conscious observations.

III.2. In search for constitutive invariants

What would a quantum constitutional observer say? It would likely ask where the meaning factory in a democratic process resides. The exploration of new meaning, of prototypal purpose, is part and parcel of the fundamental address for becoming a participative citizen: it expresses the freedom of choice from non manifested domains of possibilities.

Let's widen the context of the three partial limits representation discussed earlier on. These limits are constant primitive realities that are to be found at a higher level of representation. We distinguish three orders of representation:

1. *Individuals,* who should be the true "shareholders" of the organization — communities, institutions, associations, private or public companies, etc. — to which they belong. A worldly case is public companies who actually are mandated to serve the interests of their shareholders. This first allocation expresses the *self-referential* invariant limit.
2. *Aggregates of individuals* assembled in some organized whole or communities. They abide with and show specific interests that justify their existence as a whole and do so in the sense of a fragmented, indeed partial apprehending. This second ordination echoes the limit of *indeterminacy* in the sense of a partial understanding.
3. The *"living planet"* which both these communities and their individuals depend upon and live on. This third sphere echoes the limit of *incompleteness.*

By taking up the three levels as the citizens limit reference framework, it becomes possible to elicit three societal invariants.

III.3. Three constitutional attractors

Concretely, the question of societal epistemology would ontologically refer to the above three orders: these found the sought societal properties like fundamental values, organizational principles, and operational rules. They call for archetypal attractors expressing human consciousness in a generic way (from *arche:* start, beginning, principle, origin, and *typos:* imprint, form, species, kind). Then, how can social consciousness be expressed at the societal level? By organizing the relation to these three orders, they bring forth three major archetypal relations rooting any human society [Corsi & de Gerlache, 2022]:

- **Belonging**: the adherence capacity between the individual and the collective founding their reason for being socially. By belonging *in their diversity*, citizens expe-

[2] In contradistinction to Young's nominal experiment, abstraction is made of the slits width and inter-distance.

rience the society in which they live and strive to live through this first attractor. Belonging relates to the self-reference invariant.

- **Social cohesion**: collective myths, like religious, philosophical or other epic motif, instinctively found behavior, creating collective behavioral patterns of interacting diversities, allowing for dynamic coherence and interdependence. Networks in general and social networks in particular have demonstrated their powerful ability to re-socialize humans. This second attractor cements societal resilience *in coherence*. Social cohesion resonates with the indetermination invariant.
- **Statutory protection**: the citizenship statute is the key coupling physical individuals and moral entities to their communities beyond purely persistent "instinctive" behavior. It allows them to socially exist and perform within human and societal diversities (families, culture, organizations, politics, economics, work, etc.). It forms the third attractor pulling the pieces together meaningfully. Statutory protection is the circumscribed selection operated on the elements, *in compatible ways*, matches incompleteness. Statutory protection levels up to management and protection of society efficiency and resilience.

These generic and atemporal attractors form the agency of archetypal relationships between institutions and individual citizens. They customarily and operationally find varied normative and often prescriptive forms such as codes of law and rules, which normally translate the "soul values" of society. Also note an invariance of scale in the description. The salient point is that a mediating agent between these three categories of relationships appears as a kind of cohesive energy manifesting itself through individual and collective purpose, a conscious intent. Like individuals, conglomerates such as nations or corporations boast dual selves, an ego-based one that manifests as a behavioral persona and a more inner one with a certain degree of authenticity. This latter self usually manifests by an authoritative intention, an intent.

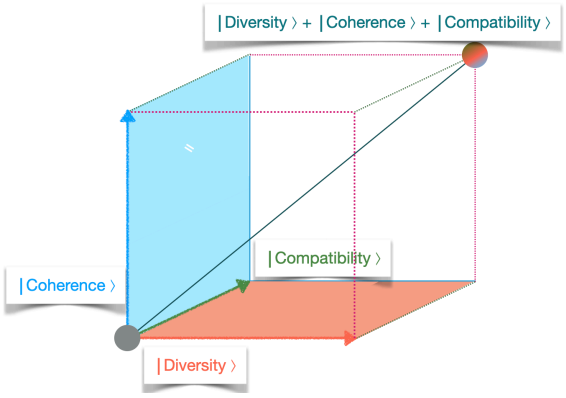

Figure 7. *A societal state is represented by an abstract 3D vector valuing the three attractors-based requirements. When opening a ballot black box, the state of society is projected to the measuring of the scalar value of the | Diversity ⟩ + | Coherence ⟩ + | Compatibility ⟩ vector.*

Constitutional objects can be represented by combining their requirements in spatial and logical dimensions. Figure 7 depicts the quantum society state integrating three complementary dimensional vector states, respectively diversity, coherence, and compatibility.

III.4. Case example

The canonical triptych *Liberty—Equality—Fraternity*[3] originating from the French Revolution can now be revisited and deepened at the light of the previous discussion:

- *Fraternity:* covering both spatial exchanges like physical transactions and sharing in economy, also reciprocal and circular mechanisms. This diversity inclusive value ontologically speaks of commensal conviviality and echoes the self-reference invariant.
- *Equality:* applies to both space in terms of access and quantities and logic in terms of independence or complementarity. This indistinctive equity value speaks of measure. and echoes indeterminacy.
- *Liberty or Freedom:* both spatial movement and social modality — an autonomy value. Over the post-modern era, developed societies have tended to exhibit separative individuality, often leading to exclusion. In quantum understanding, freedom is rather the exploration of a causal power, the freedom to choose among the various possible meanings. This 'movement' value speaks of the compatibly bounded or not search for autonomy and echoes the incompleteness invariant.

III.5. Individual agency and the exceeding the limits

Is individual agency really individual?

Citizens are individuals who can and do interact among themselves and with other social agents. Individuals are affected by their environment, psycho-social, have body, emotions, and brain as social faculties and organs. The natural way for individuals is simply being connected. They form a meaningful continuum, not just a guild of individual discrete entities. Whither these interactions lead to non-local bond was one tenet of this paper.

Further, intention triggers interactions: humans are social communicating entities prone to form cooperation bonds as soon as a common bias or interest appears and becomes accessible. Internet-based groupings are often substituting physical encounters today in an abundance of physically non-local and discontinuous ways, also creating unsought entanglements.

Exceeding the limits

Furthermore, individuals pick up environmental feelings via non-local connection to society. They can become engaged (in a choral, in a job, in military…), or stressed, develop emotions. Note the engagement of past generations into emotions-based heroic acts (e.g. the role of military music). Communities of all sorts can thus be viewed as laboratories experiencing collective consciousness. When individuals involve a non-local mode of operation through self-agency, they develop a sort of epigenetic software-like behavior which taps on societal

[3] https://www.diplomatie.gouv.fr/en/coming-to-france/france-facts/symbols-of-the-republic/article/liberty-equality-fraternity

memory — a signature acting as a non-local reference memory. Examples are tribes, clans, quarters, villages, etc. with their common, conscious or unconscious reference. At any rate, the perceived macroscopic continuity tends to lock societal becomings into determinism.

IV - On the potential meaning of living in a quantum society

« Liberty is the possibility of being and not the obligation to be. »
René Magritte

Of two visions of society

At any moment, society in its wholeness transcends the sum of its individual constituents, citizens and institutions included and so cannot be reduced to them. Its evolution owes to different factors. First, to epigenetic factors in Lamarckian tradition [Drouin, 1986], which critically widened earlier the purely Darwinist survival evolutionary principles to come later. Second, to the collective unconscious [Jung, 1981] which has however no genetic basis,. And third, to the fundamental evolutionary needs [Maslow, 1943] up to life recognition by peers and life accomplishment, where innate potential frantically fills up new possibilities.

To make social changes requires the personal shift from a Newtonian perception of reality to a transformative agency. A first vision concretely sees a set of approximately Newtonian macro objects, individuals and separate organizations. In addition, they are interacting through social networks which are based on signal-based communications.

Next, a quantum-based vision perceives intricate individuals forming a single whole-system with non-separability, supporting non-locality, experiencing deep interconnectedness. In this second view, the potentiality domain is the source of causation: individuals are social agents conscious of being, observing and acting, immersed in a collective unconscious in Freudian and Jungian sense, with causal force, from possibility to actuality. They behave as causal agents converting possibilities into realities which is a new causality, operated through the agency of conscious choices.

All this is of a nature to invite us to see reality primarily as a huge bundle of wave functions, not merely and only solid matter corpuscles. No surprise that mind-matter interaction and consciousness are unceasingly domains of intense investigation by many leading scientists since decades (recently, e.g. [Chalmers, 2010], [Hameroff, 2019], [Vitiello, 2020], etc.)[4]. Among the subject topics being researched we retain one most important in the societal context: the implication of quantum phenomena across the spectrum of physical scales up to macro.

Towards evolving society

This paper is a contribution for individuals and collective bodies like institutions towards developing collective social consciousness through bringing meaning. When society reaches the inner-outer alignment, it can become balanced and ready to seek to fulfill Goerner et al.'s conditions for equilibrium discussed early in this paper, — that is, efficiency and resilience harmoniously. The importance of ethics was nonetheless implicitly present in various conceptual embodiments all along the paper. The vision is poised to regenerate the essence of democracy — direct or representative — whereby society can be empowered with unified meaning serving individuals.

Following the fiery start of quantum mechanics a full century ago, quantum physics went though decades of longish gradual acceptation and this still goes on with debates and resistance. Time is ripest for understanding the long Newtonian age is over and past at macro and collective level, or we won't be able to acclaim the promises quantum understanding brings to all of us. Far from the many usual polarizations, Teilhard's Omega point can begin to inspire us all. His noosphere concept speaks of and for an evolving humanity, it allows for a new dynamics in society and within humans. Whereby both unite coherently and cohesively — an entangled way.

From now on, momentously hearing the 1962 Priority of paradigms call from Thomas Kuhn, and extending beyond the widely accepted and conventional problem-solving view, our society shall become our common laboratory and *We, the individuals,* the initiating subjects of new purposive experiments about the species evolution.

Express authors bio

Patrick Corsi, a Dr. in génie informatique, has long been with international companies and a successful artificial intelligence startup as engineer, manager, and technical advisor to presidents. He extensively operated within the European Commission as a senior project officer. A seasoned international consultant in innovation for companies and institutions, he fully engages into applying quantum physics to liberal and societal arts — patrick.corsi@icloud.com

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The two authors notably collaborated on the original systemic reinterpretation of the European Green Deal (accessible on the Club of Rome-EU Chapter web site). They experimented and widely published a comprehensive meta-method for (re-)designing 21th Century constitutional works, of which some illustrative results were imported in this paper.

[4] See also e.g. http://www.theisticscience.com/papers/Mind-matter_interaction.html

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