From Hilbert to Dilbert

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Readers may ask : but what can physicists learn from Dilbert cartoons?

While it seems not obvious at first glance, yes we believe there is a great character of Dilbert cartoon, i.e. to put it in one phrase: "out-of-the-box and brutally honest."

From managers who tend to criticize other folks, only to make him/her looks smart. Or people who often send "FYI emails" only to make him/her looks managing well.

We do think that such a brutal honesty is also needed in many fields of physics: from theoretical physics to applied physics, as will be discussed throughout this book.

Enjoy reading, buddy.

4th December 2018
VC & FS

From Hilbert to Dilbert

A non-orthodox approach to gravitation, psychosynthesis, economics, cosmology, and other issues

Victor Christianto & Florentin Smarandache (editors)

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Dedication

- *A tribute to Mr. **Scott Adams***

the creator of Dilbert's cartoon series. To many people like us, Dilbert is the real anti-hero of

this corporatocracym age…

(our wish is that eminent directors such as Oliver Stone will someday create something like "Dilbert the Movie." — don't laugh, we're serious)

Preface

This book took an unconventional theme because we submit an unorthodox theme too.

Karl Popper's epistemology suggests that when the theory is refuted by observation, then it is time to look for a set of new approaches. In the first chapter, it is shown that Hilbert's axiomatic program has failed not only by experiment (Mie theory does not agree with experiment) but also in terms of logic (Gödel theorem). Therefore we set out a new approach, starting from an old theory of Isaac Newton.

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4th december 2018

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Contents

Chapter 1

From Hilbert to Dilbert:
How Hilbert's attempt to unify gravitation and electromagnetism failed completely, and a plausible resolution

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Abstract

In the present paper, these authors argue on actual reasons why Hilbert's *axiomatic* program to unify gravitation theory and electromagnetism failed completely. An outline of plausible resolution of this problem is given here, based on: a) Gödel's incompleteness theorem, b) Newton's *aether stream* model. And in another paper we will present our calculation of receding Moon from Earth based on such a *matter creation* hypothesis. More experiments and observations are called to verify this new hypothesis, albeit it is inspired from Newton's theory himself.

We hear within ourselves the constant cry: There is the problem, seek the solution. You can find it through *pure thought.* –D. Hilbert, *The Problems of Mathematics*

Introduction

First of all, it is known that Hilbert and Einstein were in race at 1915 to develop a new gravitation theory based on covariance principle.[1]

While Einstein seemed to win the race at the time, Hilbert produced two communications which show that he was ahead of Einstein in term of unification of gravitation theory and electromagnetic theory. Hilbert started with Mie's electromagnetic theory. However, as Mie theory became completely failed, so was the Hilbert's *axiomatic* program to unify those two theories [1].

Einstein might be learning from such an early failure of Hilbert to unify those theories, and years later returned to Mie theory.[1]

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What we would say here is that Hilbert's axiomatic failure can be explained by virtue of Gödel's incompleteness theorem: which says essentially that any attempt to build a consistent theory based on axiomatic foundations can be shown to be inconsistent. Nonetheless only few physicists seem to grasp this result.

What can we learn from that story?

First of all, it leads us back to Newton's aether stream model as will be discussed in the following sections.

Moreover, it may be not only that it is an elusive dream to unify gravitation and electromagnetic theories from pure thoughts, but it clearly shows that we ought to return to the old days of Maxwell and also Heaviside who have given hints on how to come up with a more realistic unification of gravitation and electromagnetic theories.

To us, it also shows that we may need to re-read Maxwell's original papers, perhaps we should find out how he thought about cogwheel, molecular vortices etc...and they may lead us to a correct theory of gravitation (and also how to connect it with classical electrodynamics). In the meantime, it is worth noting here that Tesla and other experimenters have tried to come up with a simpler version of such unification theories, although most of them were not as familiar to many physicists unlike General Relativity theory.

Enter Arthur Eddington

The modern era of cosmology began with the publication of Einstein's general theory of relativity in 1915. The first experimental test of this theory was Eddington's famous expedition to measure the bending of light at a total solar eclipse in 1919. So famous is this experiment, and so dramatic was the impact on Einstein himself, that history tends not to recognize the controversy that surrounded the results at the time.[3]

To tell Eddington's role in observation regarding General Relativity, allow us to let Peter Coles spoke for that matter:[3]

> "The story of the 1919 expeditions revolves around an astronomer by the name of Arthur Stanley Eddington. His life and work is described by Douglas (1957) and Chandrasekhar (1983). Eddington was born in Cumbria in 1882, but moved with his mother to Somerset in 1884 when his father died. He was brought up as a devout Quaker, a fact that plays an important role in the story of the eclipse expedition. In 1912, aged only 30, he became the Plumian Professor of Astronomy and

Experimental Philosophy at the University of Cambridge, the most prestigious astronomy chair in Britain, and two years later he became director of the Cambridge observatories. Eddington had led an expedition to Brazil in 1912 to observe an eclipse, so his credentials made him an ideal candidate to measure the predicted bending of light. Eddington was in England when Einstein presented the general theory of relativity to the Prussian Academy of Sciences in 1915. Since Britain and Germany were at war at that time, there was no direct communication of scientific results between the two countries. But Eddington was fortunate in his friendship with the astronomer Willem De Sitter, later to become one of the founders of modern cosmology, and who was in neutral Holland at the time. De Sitter received copies of Einstein's papers, and wasted no time in passing them onto Eddington in 1916. Eddington was impressed by the beauty of Einstein's work, and immediately began to promote it. In a report to the Royal Astronomical Society in early 1917, he particularly stressed the importance of testing the theory using measurements of light bending. A few weeks later, the Astronomer Royal, Sir Frank Watson Dyson, realised that the eclipse of 29 May 1919 was especially propitious for this task. Although the path of totality ran across the Atlantic ocean from Brazil to West Africa, the position of the Sun at the time would be right in front of a prominent grouping of stars known as the Hyades. When totality occurred, the sky behind the Sun would be glittering with bright stars whose positions could be measured. Dyson began immediately to investigate possible observing sites. It was decided to send not one, but two expeditions. One, led by Eddington, was to travel to the island of Principe off the coast of Spanish Guinea in West Africa, and the other, led by Andrew Crommelin (an astronomer at the Royal Greenwich Observatory), would travel to Sobral in northern Brazil. An application was made to the Government Grant Committee to fund the expeditions, £100 for instruments and £1000 for travel and other costs. Preparations began, but immediately ran into problems. Although Britain and Germany had been at war since 1914, conscription into the armed forces was not introduced in England until 1917. At the age of 34, Eddington was eligible for the draft, but as a Quaker he let it be known that he would refuse to serve. …

There were other problems too. The light deflection expected was quite small: less than two seconds of arc. But other things could cause a shifting of the stars' position on a photographic plate. For one thing, photographic plates can expand and contract with changes in temperature. The emulsion used might not be particularly uniform. The eclipse plates might have been exposed under different conditions from the reference plates, and so on. The Sobral team in particular realised that, having risen during the morning, the temperature fell noticeably during totality, with the probable result that the photographic plates would shrink. The refractive properties of the atmosphere also change during an eclipse, leading to a false distortion of the images. And perhaps most critically of all, Eddington's expedition was hampered by bad luck even after the eclipse. Because of an imminent strike of the local steamship operators, his team was in danger of being completely stranded. He was therefore forced to leave early, before taking any reference plates of the same region of the sky with the same equipment. Instead he relied on one check plate made at Principe and others taken previously at Oxford. These were better than nothing, but made it impossible to check fully for systematic errors and laid his results open to considerable criticism. All these problems had to be allowed for, and corrected if possible in the final stage of data analysis. Scientific observations are always subject to errors and uncertainty of this kind. The level of this uncertainty in any experimental result is usually communicated in the technical literature by giving not just one number as the answer, but attaching to it another number called the 'standard error', an estimate of the range of possible errors that could influence the result. If the light deflection measured was, say, 1 arc second, then this measurement would be totally unreliable if the standard error were as large as the measurement itself, 1 arc second. Such a resultwould bepresented as '1±1' arc second, and nobodywould believe it because the measured deflection could well be produced entirely by instrumental errors. In fact, as a rule of thumb, physicists never usually believe anything unless the measured number is larger than two standard errors. The expedition teams analysed their data, with Eddington playing the leading role, cross-checked with the reference plates, checked and double-checked their standard errors. Finally, they were ready. …

A special joint meeting of the Royal Astronomical Society and the Royal Society of London was convened on 6 November 1919. Dyson presented the main results, and was followed by contributions from Crommelin and Eddington. The results from Sobral, with measurements of seven stars in good visibility, gave the deflection as 1.98±0.16 arc seconds. Principe was less convincing. Only five stars were included, and the conditions there led to a much larger error. Nevertheless, the value obtained by Eddington was 1.61±0.40. Both were within two standard errors of the Einstein value of 1.74 and more than two standard errors away from either zero or the Newtonian value of 0.87. The reaction from scientists at this special meeting was ambivalent. Some questioned the reliability of statistical evidence from such a small number of stars. This skepticism seems in retrospect to be entirely justified. Although the results from Sobral were consistent with Einstein's

prediction, Eddington had been careful to remove from the analysis all measurements taken with the main equipment, the astrographic telescope and used only the results from the 4-inch. As I have explained, there were good grounds for this because of problems with the focus of the larger instrument. On the other hand, these plates yielded a value for the deflection of 0.93 seconds of arc, very close to the Newtonian prediction. Some suspected Eddington of cooking the books by leaving these measurements out. Others, such as Ludwick Silberstein, admonished the audience. Silberstein pointed a finger at the portrait of Newton that hangs in the meeting room, and warned: 'We owe it to that great man to proceed very carefully in modifying or retouching his Law of Gravitation.' On the other hand, the eminent Professor J.J. Thomson, discoverer of the electron and Chair of the meeting, was convinced, stating

"This is the most important result obtained in connection with the theory of gravitation since Newton's day.""[3]

We present this account of history by relying on Peter Coles's paper, so readers will notice that perhaps what is displayed at "*Einstein and Eddington*" movie, which was publicly released on several TV channels, was not historically correct at least, or may be just plainly redacted.

Enter Gödel's incompleteness theorem

Gödel's groundbreaking results were obtained against the backdrop of the foundational debate of the 1920s. In 1921, reacting in part to calls for a "revolution" in mathematics by the intuitionist L. E. J. Brouwer and his own student Hermann Weyl, Hilbert had proposed a program for a new foundation of mathematics. The program called for (i) a formalization of all of mathematics in an axiomatic systems followed by (ii) a demonstration that this formalization is consistent, i.e., that no contradiction can be derived from the axioms of mathematics. Partial progress had been made by Wilhelm Ackermann and John von Neumann, and Hilbert in 1928 claimed that consistency proofs had been established for first-order number theory. Gödel's results would later show that this assessment was too optimistic; but he had himself set out to with the aim of contributing to this program.[5[

To tell Godel's monumental result, allow us to quote from Devlin:[4]

"In 1931, a young Austrian mathematician published a paper that sent shock waves through the mathematical community and forced mathematicians to take a fresh look at their discipline. The mathematician was Kurt Gödel, and the result proved in his paper became known as the Gödel Incompleteness Theorem, or more simply Gödel's Theorem—although it was by no means the only major theorem he proved during his highly successful career. He is also known as one of the inventors of the theory of recursive functions (which formed part of the foundation for computers).
Both of these major discoveries involved axiomatic systems, and neither can be properly understood without an appreciation of what mathematicians means by the word "axiom" and the role axioms play in mathematics. A misunderstanding of the nature of axioms is what lies behind a significant amount of nonsense that has been written about Gödel's Theorem over the years.
Gödel's Theorem says that in any axiomatic mathematical system that is sufficiently rich to do elementary arithmetic, there will be some statements that are true but cannot be proved (from the axioms). In technical terminology, the axiom system must be incomplete. At the time Gödel proved this theorem, it was widely believed that, with sufficient effort,

mathematicians would eventually be able to formulate axioms to support all of mathematics. The Incompleteness Theorem flew in the face of this expectation, and many took it to imply that there is a limit to the mathematical knowledge we may acquire. Few mathematicians think that way now, however. The change in our conception of mathematical truth that Godel's theorem brought about was so complete, that today most of us view the result itself as merely a technical observation about the limitations of axiom systems." [4]

To summarize: "Kurt Gödel's Incompleteness Theorem changed the concept of mathematical truth and showed the limitations of axiom-based systems." In other words, Godel effectively put Hilbert's axiomatic program into ruins. And so was Hilber's approach to unify gravitation and electromagnetic theory.

Now the hard question: is it possible to find a door outside such a Godel's spider web?

One of us (RNB) has an interpretation of Godel theorm in theoretical and mathematical physics:

> "Without observations, experiences, and explorations and experiments, our mathematics and physics start to become non-physical fictions, fantasies, or lies. Physics concepts without physical evidence to support them, do not function well, in the engineering sense.
>
> In the sense of Godel, we can never know everything there is to know, intellectually. But we can **experience** everything, directly. That is the way out of Godel's Law. Then, a new kind of intellect develops, based on direct experiences and observations, in the moment.
> Experiential intellect is superior to the analytical intellect, because it is based on the physical facts, the way things actually are, <u>now,</u> rather than abstractions based on the past.
>
> Nature functions based on experiential understandings, not abstractions.
> Summarizing: The way out of Godel's Law is Direct Experience, which is keeping the attention only in the senses and sensitivities, without thinking. This is a form of meditation."

The Dilbert way: a plausible resolution of the above problems

a. *Why is Dilbert way?*

Karl Popper's epistemology suggests that when the theory is refuted by observation, then it is time to look for a set of new approaches. Now, it is clear that Hilbert's axiomatic program has failed not only by experiment (Mie theory does not agree with experiment) but also in terms of logic (Godel theorem). Therefore we set out a new approach, starting from an old theory of Isaac Newton.

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b. *Recalling Newton's aether stream model*

Newton brought up his aether stream model in a letter to Robert Boyle, 1678. For interested readers, complete letter of Isaac Newton to Boyle can be found in Appendix section. Comments on Newton aether stream model by DeMeo go as follows:

"The letter clearly shows the young Newton, who wrote this in 1679 when he was 37 years old, had a firm belief and working grasp of the ether of space as a thing of substance and "ponderability", something which participated in the movement and ordering of the planets and universe, as a working force in optics, chemistry and gravitation. In this, Newton was continuing the conceptual ideas of Galileo, which had been such an irritant to the Vatican Bishops, who would tolerate no possibility of a motional force in nature other than God. The idea that ether and god might be identical descriptions for the "prime-mover" was equally intolerable, as while one could scientifically know and measure the ether, one could not by definition measure or know "the divine". The young Newton was not bothered by such conceptual difficulties as which bothered the Bishops of Rome, however, but the older Newton increasingly became preoccupied with theological matters, to the point that nearly all his biographers would agree he had become as much of a theologian as scientist in his last decades. Even only 20 years after penning this Letter to Boyle, he writes in the last query of his *Optics,* the following:

"Now by the help of these principles, all material things seem to have been composed of the hard and solid particles, above-mentioned, variously associated in the first creation by the counsel of an intelligent agent. For it became him who created them to set them in order. And if he did so, it's unphilosophical to seek for any other origin of the world, or to pretend that it might arise out of a chaos by the mere laws of nature; though being once formed, it may continue by those laws for many ages..." (quoted in Sullivan, p.125-126)

During those later periods, Newton would drop ideas such as a ponderable and moving cosmic ether in favor of more abstract concepts, such as the divine "prime mover" or deified "absolute space", which was foundational for most later astrophysical investigations into the nature of the cosmos. The most obvious result of this shift was, that in the original Michelson-Morley experiment for testing of ether-drift, everyone anticipated a very large ether-drift effect, based upon the assumption the Earth was racing through an intangible and substance-less static and immobile cosmic ether at very high speeds. No such intangible static ether has ever been demonstrated, nor could it be. But a material and substantive entrained ether, moving more slowly at lower altitudes and close to the speed of the earth itself, something quite similar to that proposed by the young Isaac Newton, was detected repeatedly.."[6]

Another source from Dublin recorded Newton's aether theory from letter published around 1744:

"It gathers all Newton's known queries into the aether. In the 1740s alone, there were at least half a dozen major efforts to explain the behavior of observable bodies by postulating a variety of invisible (and otherwise imperceptible) elastic fluids" (Laudan, Science and Hypothesis, 112). But for the most part, 18th c. natural philosophers thought that Newton "had always believed in, and had virtually demonstrated, the existence of an active, spring, non-material aether" (Heilbron, Elements of Early Modern Physics, 61). Bryan Robinson's work was one of the half dozen or so 18th century efforts to understand the aether; of those, it was particularly "influential" and had "considerable impact" (Brewer, Consumption, 496; Roos, Natural Philosophy, 137).

In 1744, a letter from Newton to Robert Boyle was published for the first time [and is reprinted in this volume]. "Although written sixty-five years earlier, it turned out to be of immediate scientific interest. [In it, Newton] describes an aether that lies in all bodies in amounts inversely proportional to their densities. The action of this aether derives primarily from the gradients set up in it across the interfaces between bodies of different densities; for example, the aether just outside the surface of a piece of glass surrounded by air gradually increases from that appropriate to glass to

that characteristic of air. When pushing two smooth plates of glass together, one feels a resistance (or repulsion!) from the aether squeezed aside; but once the plates lie flat, the pressure from the circumambient aether holds them firmly together. The aether therefore is the principle both of cohesion and separation; once dissolved in it the particles of vapors 'endeavor to recede as far from one another, as the pressure of the incumbent atmosphere will let them.

"Although…the letter conflicted with much in Newton's public writings, including [his] Opticks' aether queries, and although it ended with the usual disclaimer ('I have so little fancy to things of this nature, that, had not your encouragement moved me to it, I should never, I think, have thus far set pen to paper about them'), British natural philosophers took it as evidence that Newton had always believed in, and had virtually demonstrated, the existence of an active, springy, non-material aether.

These were also the inferences drawn by Robinson who, while at Trinity, "taught that Newton's aether operated the nerves and muscles of the body. In 1743 Robinson published a pseudo-mathematical account of the attractive, repulsive, elastic, cohesive and miscellaneous activities of the aether, most of which violate the laws of motion; and in 1745 he issued [this work] an aetherial chrestomathy [essentially an inclusive gathering of all Newton's queries into the aether] derived from the Opticks, the newly published letter to Boyle, and his own work on muscle action. [Robinson greatly admired Newton, and he tried to account for animal motions by Newton's principles and to apply the latter to the rational treatment of diseases. He attributed the production of muscular power to the vibration of an ethereal fluid pervading the animal body.] All this publicity had an effect, [and beginning with Robinson's 1745 work] all significant British electricians postulated a special electrical matter identical with, or similar to, the springy, subtle, universal Newtonian aether" (ibid).

Bryan Robinson graduated M.D. in 1711 from Trinity College, Dublin, where he later served as an anatomical lecturer and as Regius Professor of Physic from 1745. He was also thrice president of the Kings and Queen's College of Physicians in Ireland and of the Irish Royal College of Surgeons" (Roos, Natural Philosophy, 137). Item #727"[7]

c. Remark on Aether stream by RNB (especially on Yarkovsky's model)

The higher the energy, the higher the velocity of the aether entities in the given place and time, and the lower the density. The phase states can exhibit turbulence, which is more marked at the higher densities, the way I am looking at this right now. The Kolmogorov Limit of 10e -58 meters plays a part here. Entities smaller than that will not exhibit much turbulence, primarily because they tend to be superluminal, so any turbulence will be hard to see.

The following figure is on Mishin's Aether phase states:
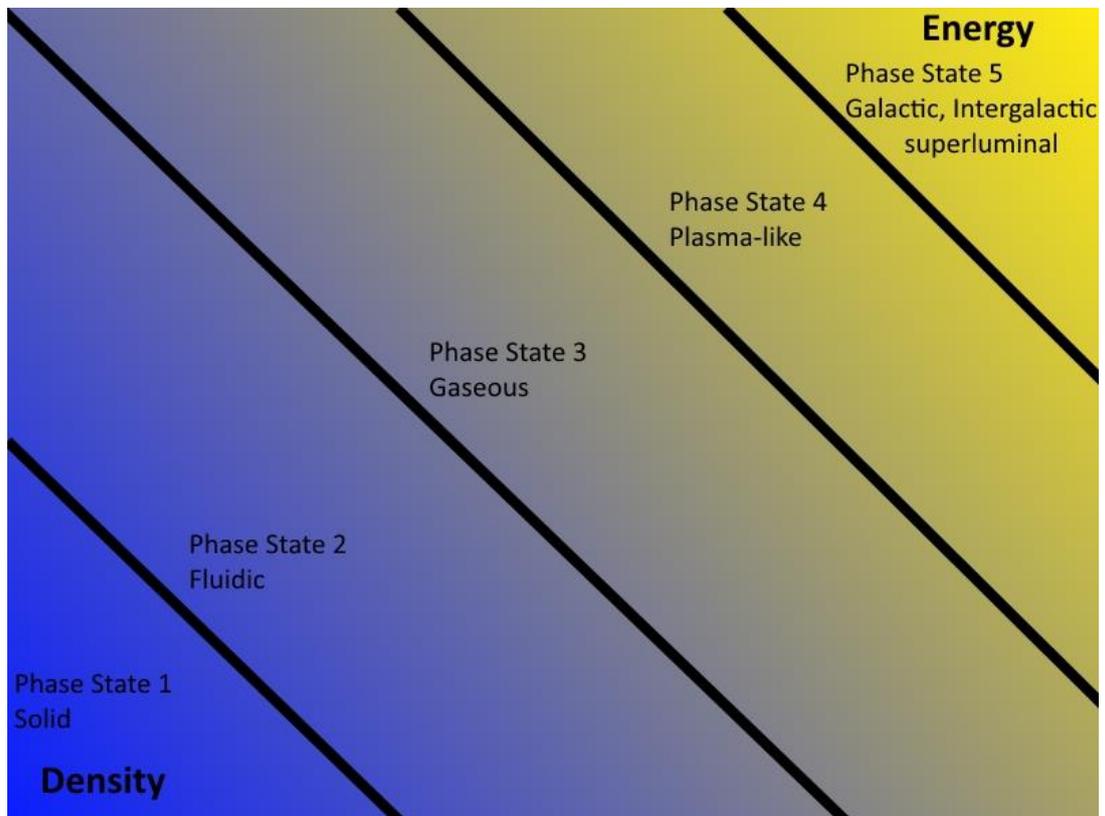
Figure 1. Aether phase states (Mishin), after R.N. Boyd

There is an illustration of the process of aether particles being slowed by existing matter and eventually forming electron vortices as the local aether density and turbulence increases, while the energy drops due to interactions with existing matter, or aether in a denser phase state.
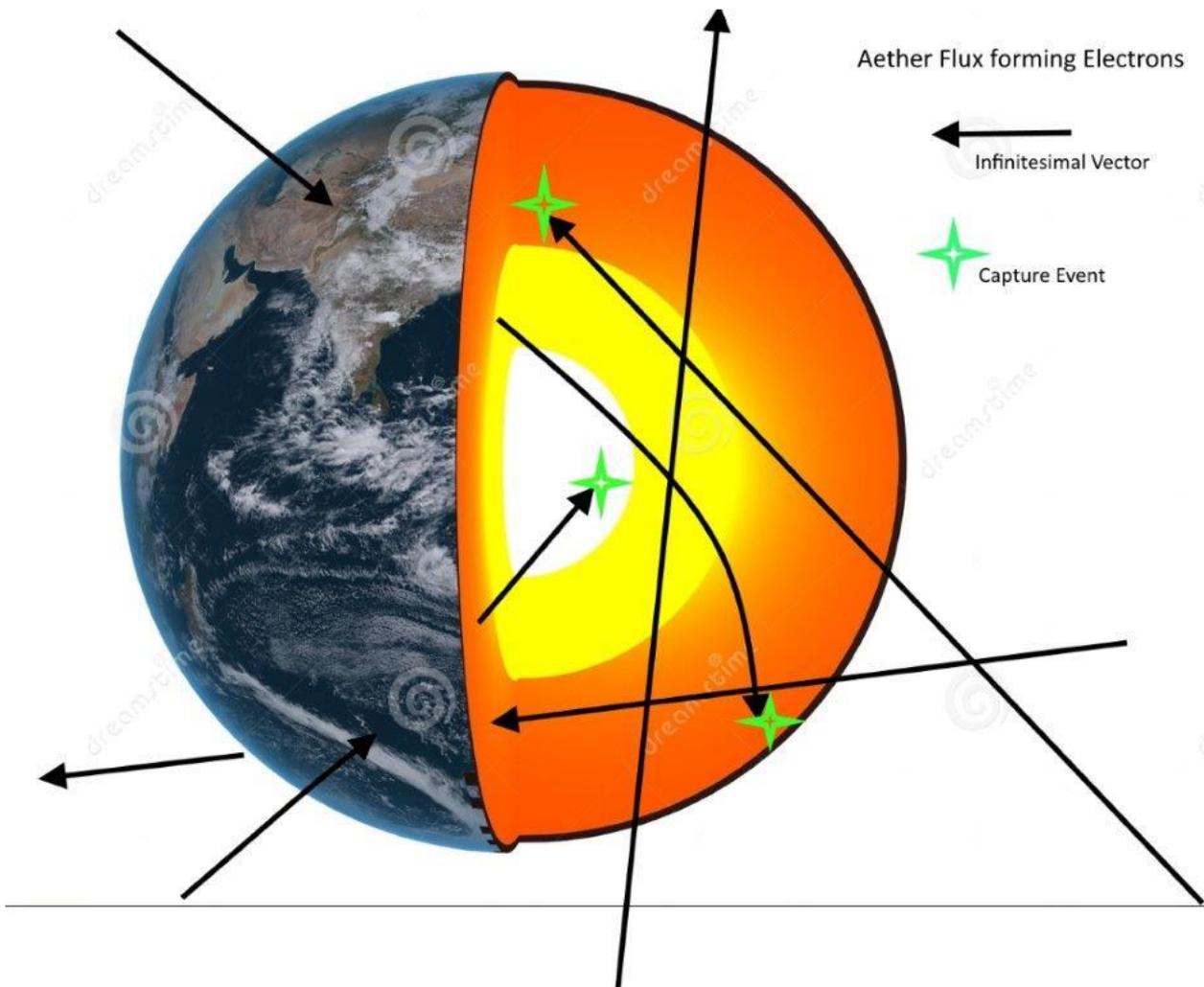
Figure 2. llustration on how matter creation can take place in inner core of Earth

(Source: https://www.dreamstime.com/royalty-free-stock-photography-earth-core-image1890727)

The process of matter creation can be attributed to electron vortex capture event.

This illustration shows stellar and interstellar aether flows interacting with electron vortices. In some cases the stellar flux is diverted by the electron vortex. In other cases, the flux entity misses entirely, similar to a neutrino. In some unusual cases the flux is captured by an electron vortex and participates in it for a while.

Each electron which already exists, acts as a large rock in a moving stream, causing deflections of the normal aether flow, slowing down the flow-rate, and producing eddy currents and turbulence in the ambient aether near the given electron. When the turbulence becomes large enough, additional electrons form in the media, which act to

choke off the interstellar aether flow even more and impede its normally unencumbered motion. This is similar to adding more and more rocks into the channel of a stream of water, so that the flow rate of the water slows down, as more and more rocks are added.

This process was discovered by Nikola Tesla during his experiments at his Colorado Springs laboratory, where my grandfather was employed by Tesla, during those days. It is a good thing this happens, or aether avalanches produced by Tesla's 100,000,000 volt explosive electrical discharge events could have burned away the very air we live in.

Tesla was relieved to find out the discharges were choked off, accompanied by vast numbers of newly created electrons. Tesla found the excess electricity resulting from the excess electrons to be a nuisance to his other experiments, so he dumped the excess electrical power into the earth's crust.

Helmholtz electron vortices can be destroyed by aether shock fronts resulting from high dv/dt electrical discharges which are approaching the ideal of a Dirac delta function. In that situation, the Helmholtz vortex is disintegrated. The aether which originally formed the particle vortex, becomes part of the shock front and is carried along with the aether shock wave at velocities similar to the shock front, until the shock front dissipates. At that point, all that remains is a propagating aether stream, diverging at the rate of 1/r, relative to the source.

Everything is made of aether infinitesimals. Their group streaming motions precede the known forces, in the form of vector potentials. All matter is made from accumulations of infinitesimals. And all matter can be dissipated back into its constituent infinitesimals. See also figure below:
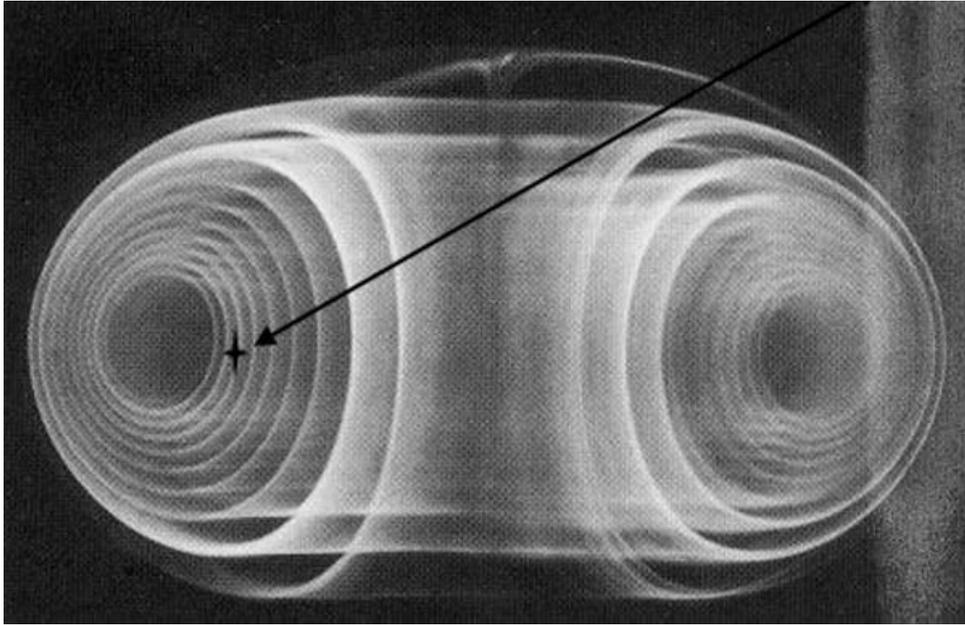
Figure 3. electron vortex capture event – Helmholtz electron vortex is *nearly indestructible* (after R.N. Boyd)
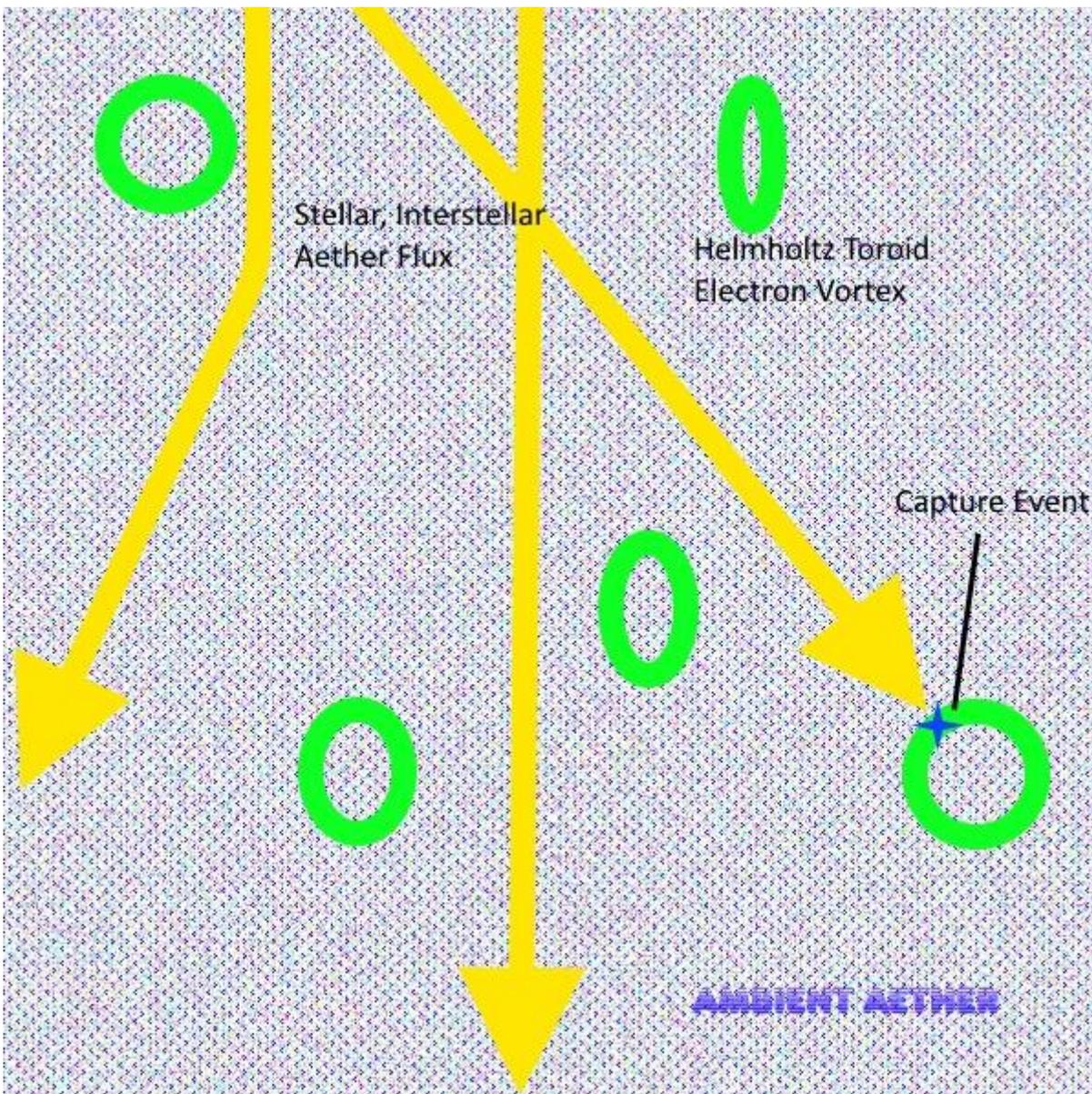
Figure 3a. electron vortex capture event(after R.N. Boyd)

The Helmholtz vortex model of the electron as illustrated in the photo of a Helmholtz vortex (Fig. 3), is a toroid made of nested concentric toroidal flows of smaller particles. Lines of constant flow are given by

$$r = \mathbf{a} \sin \Omega = \mathbf{a} \sin \Omega t,$$

where $\mathbf{a}$ is a constant. The velocity components are

$$dr/dt = \mathbf{a} \, \Omega \cos \Omega t$$

and

r dθ/dt = **a** 'Ω sin 'Ω t

The 'Ωt implies that a characteristic wave function is associated with the vortex, but we haven't worked on it yet. This may be an indication of origin of the de Broglie wave of the electron, or it may have something to do with the Compton radius of the electron, or both.

The constant **a** may represent the outer limit of the vortex-particle, if the internal circulation velocity of smaller particles does not exceed light speed. If the circulation velocity is larger than c, at the outer shells of the nested vortex, there may be a species of sub-particles which is always being removed from the nested toroidal form, which must be replenished to the vortex which is living in an "atmosphere" made larger circulations of sub-particles. This is due to considering the electron as having a fixed mass, a fixed extent, and a fixed charge (which may not be the case for all time and in all circumstances).

There should be some set of equations which shows vortex sub-particle replacement activities from the ambient aether, but we haven't worked on it either.

The first equation is a circle tangent to the z axis at the origin, with a center located in the X Y plane at the distance

a/2 = p

where p is the potential of the electron, and is independent of the orientation of the electron vortex.

Then the electron can be viewed as a toroid, with a volume

V = 2 π r times π r ^2 = 2 π^2 r^3

Three potentials are indicated here: Static potential, Spin potential, and a Dipole potential. Since the electron vortex has mass (which may change from its present value,

according to the parameters of the ambient aether in the vicinity of the electron at the given place and time), a total of six potentials are implied.

Moreover, for years, one of us (RNB) developed a novel theory of gravity based on an old theory of Le Sage/Laplace (it is known as Le Sage gravitation theory). An interesting remark on impetus to Le Sage gravitation theory can be found in article by the late Prof. Halton Arp on his work with Narlikar:

> "Nevertheless the ball had started rolling down hill so to speak and in 1991, with Narlikar's help, I outlined in Apeiron the way in which particle masses growing with time would account for the array of accumulated extragalactic paradoxes. Later Narlikar and Arp (1993) published in the Astrophysical Journal Narlikar's original, 1977 solution of the basic dynamical equations along with the Apeiron applications to the quasar/galaxy observations.
>
> …
>
> The first insight came when I realized that the Friedmann solution of 1922 was based on the assumption that the masses of elementary particles were always and forever constant, $m = const$. He had made an approximation in a differential equation and then solved it. This is an error in mathematical procedure. What Narlikar had done was solve the equations for $m = f(x,t)$. This a more general solution, what Tom Phipps calls a covering theory.
>
> …
>
> But Narlikar had overwhelmed me with the beauty of the variable mass solution by showing how the local dynamics could be recovered by the simple conformal transformation from t time (universal) to what we called τ time (our galaxy) time. The advertisement here was that our solution inherited all the physics triumphs much heralded in general relativity but also accounted for the non-local phenomena like quasar and extragalactic redshifts."[16]

Summarizing, it is very significant to consider matter creation process in nature. For instance, one can begin by considering the correct presentation of Newton's third law is not F=ma, but F=d(mv)/dt=v(dm/dt) + m(dv/dt). In other words, it is possible of matter creation (dm/dt), and this is consistent with Narlikar's work. We will explore this effect in receding Moon from Earth, in calculations to be presented in a sequel paper.

d. *Introducing acoustic model of space*

With regards to spacetime metric which is conventionally attributed to Special Relativity, Thornhill has argued in favour of *acoustic nature of space* which conforms reality, instead of relativity with its notorious denial view on the existence of Aether stream. The following argument is derived from Thornhill.

In one of his remarkable papers, the late C.K. Thornhill wrote as follows:

"Relativists and cosmologists regularly refer to space-time without specifying precisely what they mean by this term. Here the two different forms of spacetime, real and imaginary, are introduced and contrasted. It is shown that, in real space-time (x, y, z, ct), Maxwell's equations have the same wave surfaces as those for sound waves in any uniform fluid at rest, and thus that Maxwell's equations are not general and invariant but, like the standard wave equation, only hold in one unique frame of reference. In other words, Maxwell's equations only apply to electromagnetic waves in a uniform ether at rest. But both Maxwell's equations and the standard wave equation, and their identical wave surfaces, transform quite properly, by Galilean transformation, into a general invariant form which applies to waves in any uniform medium moving at any constant velocity relative to the reference-frame. It was the mistaken idea, that Maxwell's equations and the standard wave equation should be invariant, which led, by a mathematical freak, to the Lorentz transform (which demands the non-ether concept and a universally constant wave-speed) and to special relativity. The mistake was further compounded by misinterpreting the differential equation for the wave hypercone through any point as the quadratic differential form of a Riemannian metric in imaginary space-time (x, y, z, ict). Further complications ensued when this imaginary space-time was generalised to encompass gravitation in general relativity."[9]

Acoustic Analogue of Space

In this section, we borrow some important ideas from C.K. Thornhill and also Tsutomu Kambe. According to Thornhill, real space-time is a four dimensional space consisting of three-dimensional space plus a fourth length dimension obtained by multiplying time by a constant speed. (This is usually taken as the constant wave-speed c of electromagnetic waves). If the four lengths, which define a four-dimensional metric (x, y, z, ict), are thought of as measured in directions mutually at right-angles, then the quadratic differential form of this metric is: [9]

$$(ds)^2 = (dx)^2 + (dy)^2 + (dz)^2 - \bar{c}^2 (dt)^2 \tag{1}$$

When the non-differential terms are removed from Maxwell's equations, i.e. when there is no charge distribution or current density, it can easily be shown that the components (E1 ,E2 ,E3) of the electrical field-strength and the components (H1 ,H2 ,H3) of the magnetic field-strength all satisfy the standard wave equation: [9]

$$\nabla \phi = \left(\frac{1}{\bar{c}^2} \right) \frac{\partial^2 \phi}{\partial t^2} \tag{2}$$

It follows immediately, therefore, that the wave surfaces of Maxwell's equations are exactly the same as those for sound waves in any uniform fluid at rest, and that Maxwell's equations can only hold in one unique reference-frame and should not remain invariant when transformed into any other reference-frame. In particular, the equation for the envelope of all wave surfaces which pass through any point at any time is, for equation (2), and therefore also for Maxwell's equations [9],

$$(dx)^2 + (dy)^2 + (dz)^2 = \bar{c}^2 (dt)^2,$$ (3)

or

$$\frac{(dx)^2}{(dt)^2} + \frac{(dy)^2}{(dt)^2} + \frac{(dz)^2}{(dt)^2} = \bar{c}^2$$ (4)

It is by no means trivial, but it is, nevertheless, not very difficult to show, by elementary standard methods, that the general integral of the differential equation (4), which passes through (x_1, y_1, z_1) at time t_1, is the right spherical hypercone [9]

$$(x - x_1)^2 + (y - y_1)^2 + (z - z_1)^2 = \bar{c}^2 (t - t_1)^2$$ (5)

In other words, both *Maxwell equations and space itself has the sound wave origin.*

It is also interesting to remark here that Maxwell equations can be cast in the language of vortex sound theory, as follows.

Prof. T. Kambe from University of Tokyo has made a connection between the equation of vortex sound and fluid Maxwell equations. He wrote that it would be no exaggeration to say that any vortex motion excites *acoustic* waves. He considers the equation of vortex sound of the form: [10]

$$\frac{1}{c^2}\partial_t^2 p - \nabla^2 p = \rho_0 \nabla . L = \rho_0 div(\omega \times v) \tag{6}$$

He also wrote that dipolar emission by the vortex-body interaction is [11]:

$$p_F(x,t) = -\frac{P_0}{4\pi c}\dot{\Pi}_i(t - \frac{x}{c})\frac{x_c}{x^2} \tag{7}$$

Then he obtained an expression of fluid Maxwell equations as follows [12]:

$$\begin{aligned} &\nabla \cdot H = 0 \\ &\nabla \cdot E = q \\ &\nabla \times E + \partial_t H = 0 \\ &a_0^2 \nabla \times H - \partial_t E = J \end{aligned} \tag{8}$$

Where [12] a_0 denotes the sound speed, and

$$\begin{aligned} &q = -\partial_t(\nabla \cdot \upsilon) - \nabla \hbar, \\ &J = \partial_t^2 v + \nabla \partial_t h + a_o^2 \nabla \times (\nabla \times \upsilon) \end{aligned} \tag{9}$$

In our opinion, this new expression of fluid Maxwell equations suggests that there is a deep connection between vortex sound and electromagnetic fields. However, it should be noted that the above expressions based on fluid dynamics need to be verified with experiments. We should note also that in (8) and (9), the speed of sound a_0 is analogous of the speed of light in Maxwell equations, whereas in equation (6), the speed of sound is designated "c" (as analogous to the light speed in EM wave equation). For alternative hydrodynamics expression of electromagnetic fields, see [14-15].

e. More proof: *Calculating matter creation in Earth and its effect*

One of us has performed a calculation to show that the observed receding Moon from Earth, should be properly attributed to increasing size of the Earth. The latter phenomenon could be attributed to "matter creation" as effect of aether stream (vortex). We will discuss this in a separate report.

f. More proof: *Dayton Miller's experiment*

DeMeo remark on Dayton Miller's experiment:

"The history of science records the 1887 ether-drift experiment of Albert Michelson and Edward Morley as a pivotal turning point, where the energetic *ether of space* was discarded by mainstream physics. Thereafter, the postulate of "empty space" was embraced, along with related concepts which demanded constancy in light-speed, such as Albert Einstein's relativity theory. The now famous *Michelson-Morley experiment* is widely cited, in nearly every physics textbook, for its claimed "null" or "negative" results. Less known, however, is the far more significant and detailed work of Dayton Miller.

Dayton Miller's 1933 paper in *Reviews of Modern Physics* details the positive results from over 20 years of experimental research into the question of ether-drift, and remains *the most definitive body of work on the subject of light-beam interferometry*. Other positive ether-detection experiments have been undertaken, such as the work of Sagnac (1913) and Michelson and Gale (1925), documenting the existence in light-speed variations (c+v > c-v), but these were not adequately constructed for detection of a larger cosmological *ether-drift*, of the Earth and Solar System moving through the background of space. Dayton Miller's work on ether-drift was so constructed, however, and yielded *consistently positive results*.

Miller's work, which ran from 1906 through the mid-1930s, most strongly supports the idea of an ether-drift, of the Earth moving through a cosmological medium, with calculations made of the actual direction and magnitude of drift. By 1933, Miller concluded that the Earth was drifting at a speed of 208 km/sec. towards an apex in the Southern Celestial Hemisphere, towards Dorado, the swordfish, right ascension 4 hrs 54 min., declination of -70° 33', in the middle of the Great Magellanic Cloud and 7° from the southern pole of the ecliptic. (Miller 1933, p.234)"[8]
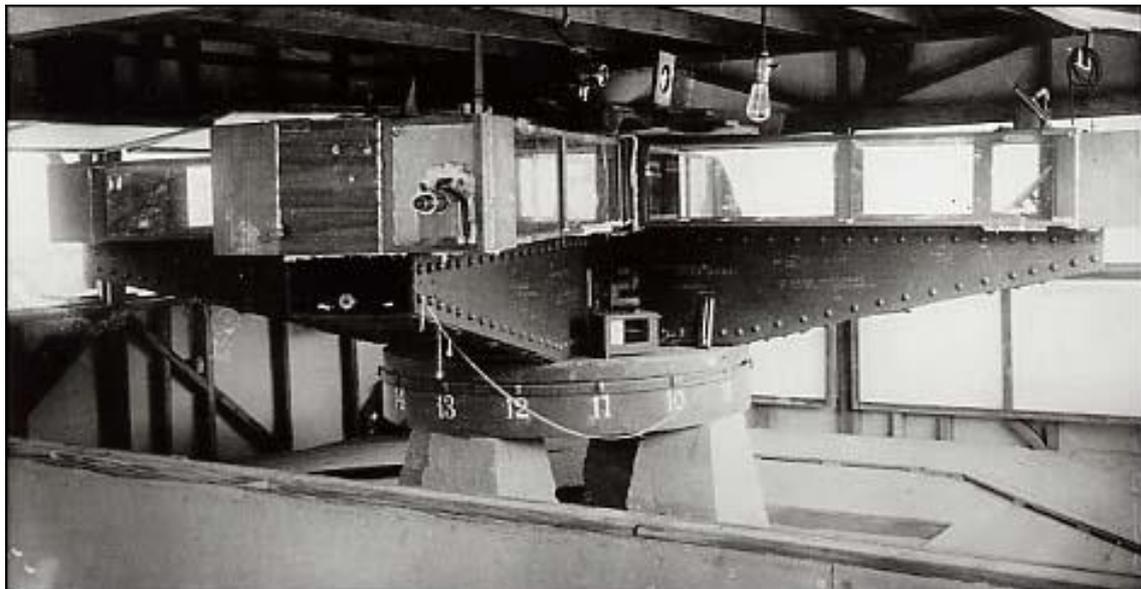
Figure 4. **Dayton Miller's light-beam interferometer,** at 4.3 meters across, was the largest and most sensitive of this type of apparatus ever constructed, with a mirror-reflected round-trip light-beam path of 64 meters. It was used in a definitive set of ether-drift experiments on Mt. Wilson, 1925-1926. Protective insulation is removed in this photograph, and windows were present all around the shelter at the level of the interferometer light-path. [8]

The followings are quotes from Miller and Einstein as mentioned in DeMeo's article:[8]

"The effect [of ether-drift] has persisted throughout. After considering all the possible sources of error, there always remained a positive effect." — Dayton Miller (1928, p.399)

"My opinion about Miller's experiments is the following. ... Should the positive result be confirmed, then the special theory of relativity and with it the general theory of relativity, in its current form, would be invalid. Experimentum summus judex. Only the equivalence of inertia and gravitation would remain, however, they would have to lead to a significantly different theory."
— Albert Einstein, in a letter to Edwin E. Slosson, 8 July 1925 (from copy in Hebrew University Archive, Jerusalem.) See citations below for Silberstein 1925 and Einstein 1926.

"I believe that I have really found the relationship between gravitation and electricity, assuming that the Miller experiments are based on a fundamental error. Otherwise, the whole relativity theory collapses like a house of cards."
— Albert Einstein, in a letter to Robert Millikan, June 1921 (in Clark 1971, p.328)

"You imagine that I look back on my life's work with calm satisfaction. But from nearby it looks quite different. There is not a single concept of which I am convinced that it will stand firm, and I feel uncertain whether I am in general on the right track."
— Albert Einstein, on his 70th birthday, in a letter to Maurice Solovine, 28 March 1949 (in B. Hoffman *Albert Einstein: Creator and Rebel* 1972, p.328)

That Dayton Miller's experiment seems quite consistent with other experiments such as Michelson-Morley non-null result, which indicates solar system in motion. [21-22].

g. More proof: *preferred direction and Milky Way moving to The Great Attractor*
Another type of observations seems to suggest that there is preferred direction in the Universe at large scale, and especially that the Milky Way is moving at large speed toward the Great Attractor.[18-20] While this effect may be not detected in the Miller's days, two things are for sure: (a) no general relativity based theories can explain this effect, and (b) it makes Copernican Principle on question. This effect is seemingly consistent with Tifft's finding of rest background frame.[17]
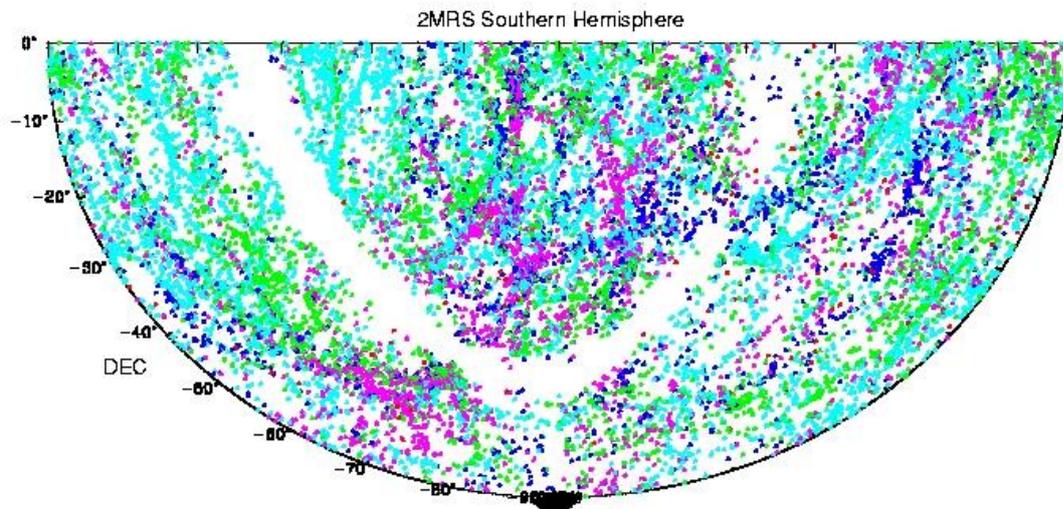
Figure 5. The Great Attractor from Southern Hemisphere
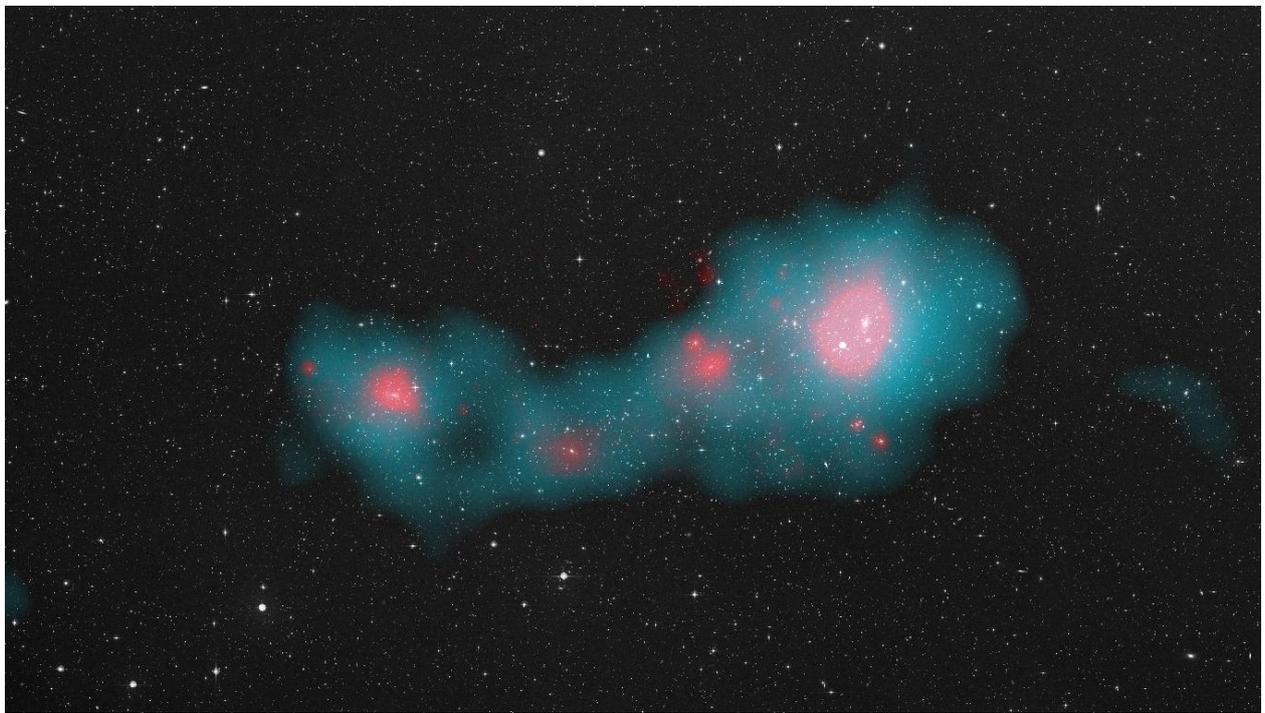
Figure 6. Shapley Supercluster
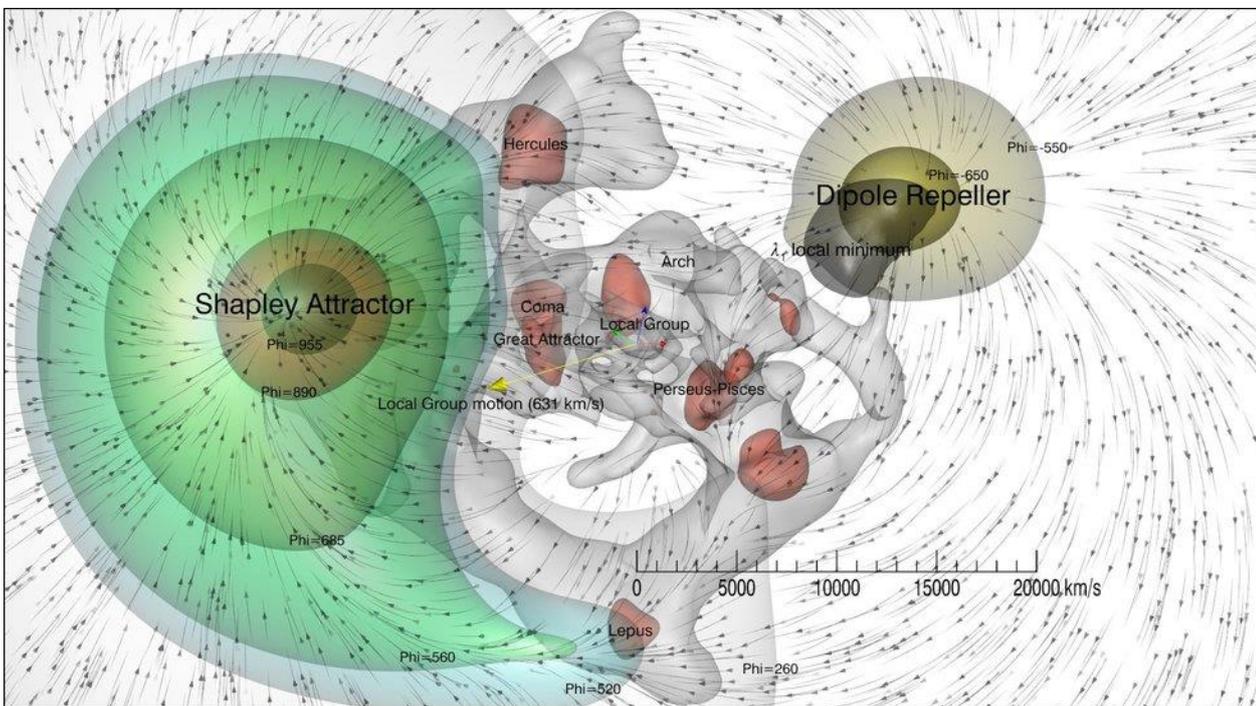
Figure 7. Shapley Supercluster

Concluding remarks

We begin with Hilbert's axiomatic program to unify electromagnetic and gravitation theory, and we remark that Godel finding effectively put Hilbert program into ruins. We also mentioned Eddington's observation, because this month is centenary celebration of that eclipse observation by Eddington in November 1918.

Summarizing, it is very significant to consider matter creation process in nature. For instance, one can begin by considering the correct presentation of Newton's third law is not F=ma, but F=d(mv)/dt=v(dm/dt) + m(dv/dt). In other words, it is possible of matter creation (dm/dt), and this is consistent with Narlikar's work. This seems to be the essence of Le Sage gravity theory.

We will explore this effect in receding Moon from Earth, in calculations to be presented in a sequel paper.

We are also working out a book on this topic with Dr. Robert Neil Boyd and Dr. Slobodan Nedic, on Laplace model of gravitation and also aetherdynamics theory, so we can expect some new results. The title of the upcoming book is: Going beyond Tesla.

Lo, this only have I found, that God hath made man upright; but they have sought out many inventions. - Ecclesiastes 7:29

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Version 1.0: 9/11/2018, pk. 7:14

Version 1.1: 10/11/2018, pk. 21:40 (National Heroic Day, and also 100th anniversary of Eddington's observation bending of light during Eclipse)

Version 1.2: 11/11/2018, pk. 21:37

VC, FS, RNB

Letter from Newton to Robert Boyle, dated 28 February 1678/9

Author: Isaac Newton

Source: MS Add. 9597/2/18/62-65, Cambridge University Library, Cambridge, UK

Published online: February 2013

Honoured Sir

I have so long deferred to send you my thoughts about the Physicall qualities we spake of, that did I not esteem my self obliged by promise I think I should be ashamed to send them at all. The truth is my notions about things of this kind are so indigested that I am not well satisfied my self in them, & what I am not satisfied in I can scarce esteem fit to be communicated to others, especially in natural Philosophy where there is no end of fansying. But because I am indebted to you & yesterday met with a friend Mr Maulyverer, who told me he was going to London & intended to give you the trouble of a visit, I could not forbear to take the opportunity of conveying this to you by him.

It being only an explication of qualities which you desire of me, I shall set down my apprehensions in the form of suppositions as follows. And first I suppose that there is diffused through all places an æthereal substance capable of contraction & dilatation, strongly elastick, & in a word much like air in all respects, but far more subtile.

2 I suppose this æther pervades all gross bodies, but yet so as to stand rarer in their pores then in free spaces, & so much the rarer as their pores are less. And this I suppose (with others) to be the cause why light incident on those bodies is refracted towards the perpendicular; why two well polished metalls cohere in a Receiver exhausted of air: why Quicksilver stands sometimes up to the top of a glass pipe though much higher than 30 inches: & one of the main causes why the parts of all bodies cohere. Also the cause of philtration & of the rising of water in small glass pipes above the surface of the stagnating water they are dipt into: for I suspect the æther may stand rarer not only in the insensible pores of bodies, but even in the very sensible cavities of those pipes. And the same principle may cause Menstruums to pervade with violence the pores of the bodies they dissolve, the surrounding æther as well as the Atmosphere pressing them together.

3 I suppose the rarer æther within bodies & the denser without them, not to be terminated in a mathematical superficies but to grow gradually into one another: the external æther beginning to grow rarer, & the internal to grow denser at some little distance from the superficies of the body, & running through all intermediate degrees of density in the intermediate spaces. And this may be the cause why light in Grimaldo's experiment

passing by the edge of a knife or other opake body is turned aside & as it were refracted, & by that
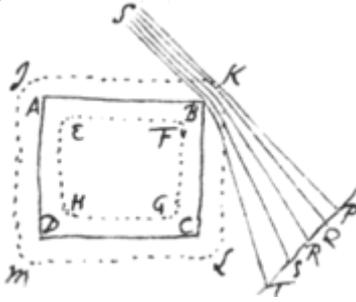
refraction makes several colours. Let ABCD be a dense body whether opake or transparent, EFGH the outside of the uniform æther which is within it, IKLM the inside of the uniform æther which is without it; & conceive the æther which is between EFGH and IKLM to run through <62v> all intermediate degrees of density between that of the two uniform æthers on either side. This being supposed, the rays of the sun SB, SK, which pass by the edge of this body between B & K, ought in their passage through the unequally dense æther there, to receive a ply from the denser æther which is on that side towards K, & that the more by how much they pass nearer to the body, & thereby to be scattered through the space PQRST, as by experience they are found to be. Now the space between the limits EFGH & IKLM I shall call the space of the æther's graduated rarity.

4 When two bodies moving towards one another come neare together I suppose the æther between them to grow rarer then before, & the spaces of its graduated rarity to extend further from the superficies of the bodies towards one another, & this by reason that the æther cannot move & play up & down so freely in the strait passage between the bodies as it could before they came so neare together. Thus if
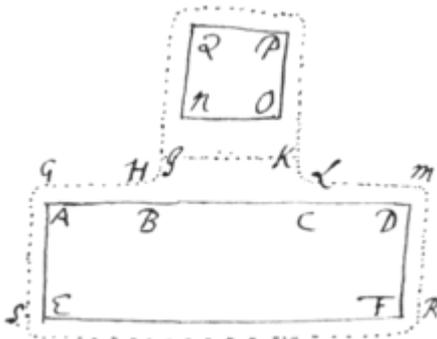
the space of the æther's graduated rarity reach from the body ABCDFE only to the distance GHLMRS when no other body is neare it, yet may it reach farther, as to IK, when another body NOPQ approaches: & as the other body approaches more & more I suppose the æther between them will grow rarer & rarer.

These suppositions I have so described as if I thought the spaces of graduated æther had precise limits, as is exprest at IKLM in the first figure & GMRS in the second: for thus I thought I could better express my self. But really I do not think they have such precise limits but rather decay insensibly, & in so decaying extend to a much greater distance then can easily be beleived or need be supposed.

5 Now from the 4th supposition it follows that when two bodies approaching one another, come so neare together as to make the æther between them begin to rarefy, they will begin to have a reluctance from being brought nearer together, & an endeavour to recede from one another: which reluctance & endeavour will encrease as they come nearer together because thereby they cause the interjacent æther to rarefy more & more. But at length, when they come so neare together that the excess of pressure of the external æther which surrounds the bodies, above that of the rarefied æther which is between them, is so great as to

overcome the reluctance which the bodies have from being brought together: then will that excess of pressure drive them with violence together & make them adhere strongly to one another, as was said in the second supposition. For instance in the second Figure when the bodies ED & NP are so neare together, that the spaces of the æthers graduated rarity begin to reach to one another & meet in the line IK; the æther between them will have suffered much rarefaction which rarefaction requires much force that is much pressing of the bodies together: & the endeavour which the æther between them has to return to its former natural state of condensation will cause the bodies to have an endeavour of receding from one another. But on the other hand to counterpoise this endeavour there will not yet be any excess of density of the æther which surrounds the bodies above that of the æther which is between them at the line IK. But if the bodies come nearer together so as <63r> to make the æther in the mid-way-line IK grow rarer then the surrounding æther, there will arise from the excess of density of the surrounding æther a compressure of the bodies towards one another: which when by the nearer approach of the bodies it becomes so great as to overcome the afforesaid endeavour the bodies have to recede from one another, they will then go towards one another & adhere together. And on the contrary if any power force them as under to that distance where the endeavour to recede begins to overcome the endeavour to accede, they will again leap from one another. Now hence I conceive it is chiefly that a fly walks on water without wetting her feet, & consequently without touching the water; that two polished pieces of glass are not without pressure brought to contact, no not though the one be plain, the other a little convex; that the particles of dust cannot by pressing be made to cohere, as they would do if they did but fully touch; that the particles of tinging substances & salts dissolved in water do not of their own accord concrete & fall to the bottom, but diffuse themselves all over the liquor, & expand still more if you ad more liquor to them. Also that the particles of vapors exhalations & air do stand at a distance from one another, & endeavour to recede as far from one another as the pressure of the incumbent atmosphere will let them: for I conceive the confused mass of vapors air & exhalations which we call the Atmosphere to be nothing els but the particles of all sorts of bodies of which the earth consists, separated from one another & kept at a distance by the said principle.

From these principles the actions of Menstruums upon bodies may be thus explained. Suppose any tinging body as Cochineel or Logwood be put into water, so soon as the water sinks into its pores & wets on all sides any particle, which adheres to the body only by the principle in second supposition: it takes of or at least much diminishes the efficacy of that principle to hold the particle to the body because it makes the æther on all sides the particle to be of a more uniform density then before. And then the particle being shaken of by any little motion, flotes in the water, & with many such others makes a tincture; which tincture will be of some lively colour if the particles be all of the same size & density, otherwise of a dirty one. For the colours of all natural bodies whatever seem to depend on nothing but the various sizes & densities of their particles: as I think you have seen described by me more at large in another paper. If the particles be very small (as are those of salts Vitriols & gumms) they are transparent, & as they are supposed bigger & bigger they put on these colours in order black, white, yellow, red; violet, blew, pale green, yellow, orange, red; purple, blew, green, yellow, orange, red &c: as is discerned by the colours which appear at the several thicknesses of very thin plates of transparent bodies. Whence to know the causes of the changes of colours which are often made by the mixtures of several liquors, it is to be considered how the particles of any tincture may have their size or density altered by the infusion of another liquor.

When any metal is put into common water, the water cannot enter into its pores to act on it & dissolve it. Not that water consists of too gross parts for this purpose, but because it is unsociable to metal. For there is a certain secret principle in nature by which liquors are sociable to some things & unsociable to others. Thus water will not mix with oyle but readily with spirit of wine or with salts. It sinks also into wood which Quicksilver will not, but Quicksilvers sinks into metals, which, as I said, water will not. So Aqua fortis dissolves silver not gold; Aqua regis gold & not silver, &c. But a liquor which is of it self unsociable to a

body may by the mixture of a convenient mediator be made sociable. So molten Lead which alone will not mix with copper or with Regulus of Mars, by the addition of Tin is made to mix with either. And water by the mediation of saline spirits <63v> will mix with metal. Now when any metal is put in water impregnated with such spirits, as into Aqua fortis, Aqua Regis, spirit of Vitriol or the like, the particles of the spirits as they in floting in the water, strike on the metal, will by their sociableness enter into its pores & gather round its outside particles, & by advantage of the continual tremor the particles of the metal are in, hitch themselves in by degrees between those particles & the body & loosen them from it, & the water entring into the pores together with the saline spirits, the particles of the metal will be thereby still more loosed, so as by that motion the solution puts them into, to be easily shaken of & made to Rote in the water: the saline particles still encompassing the metallick ones as a coat or shell does a kernell, after the manner expressed
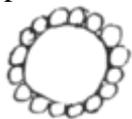
in the annexed figure. In which figure I have made the particles round, though they may be cubical or of any other shape.

If into a solution of metal thus made, be poured a liquor abounding with particles, to which the former saline particles are more sociable then to the particles of the metal, (suppose with particles of salt of Tartar:) then so soon as they strike on one another in the liquor, the saline particles will adhere to those more firmly then to the metalline ones, & by degrees be wrought of from those to enclose these. Suppose A a metalline particle enclosed with saline ones of spirit of Nitre, & E a particle of salt of Tartar contiguous to two of the
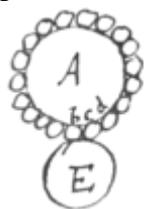
particles of spirit of nitre b & c, & suppose the particle E is impelled by any motion towards d so as to roll about the particle c till it touch the particle d: the particle b adhering more firmly to E then to A, will be forced off from A. And by the same means the particle E as it rolls about A will tear of the rest of the saline particles from A, one after another, till it has got them all or almost all about it self. And when the metallic particles are thus divested of the nitrous ones which as a mediator between them & the water held them floting in it: the Alcalizate ones crouding for the room the metallic ones took up before, will press these towards one another & make them come more easily together: so that by the motion they continually have in the water they shall be made to strike on one another, & then by means of the principle in the second supposition they will cohere & grow into clusters, & fall down by their weight to the bottom, which is called precipitation.

In the solution of metals, when a particle is loosing from the body, so soon as it gets to that distance from it where the principle of receding described in the 4th & 5^t suppositions begins to overcome the principle of acceding described in the second supposition: the receding of the particle will be thereby accelerated, so that the particle shall as were with violence leap from the body, & putting the liquor into a brisk agitation, beget & promote that heat we often find to be caused in solutions of Metals. And if any particle happen to leap of thus from the body before it be surrounded with water, or to leap of with that smartness as to get loos from the water: the water by the principle in the 4th & 5^t suppositions, will be kept of from the particle & stand round about it like a spherically hollow arch, not being able to come to a full contact with it any more. And severall of these particles afterwards gathering <64r> into a cluster, so as by the same principle to stand at a distance from one another without any water between them, will compose a buble. Whence I suppose it is that in brisk solutions there usually happens an ebullition.

This is one way of transmuting gross compact substances into aereal ones. Another way is by heat. For as fast as the motion of heat can shake off the particles of water from the surface of it: those particles by the said principle will Rote up & down in the air at a distance both from one another & from the particles of air, & make that substance we call vapor. Thus I suppose it is when the particles of a body are very small (as I suppose those of water are) so that the action of heat alone may be sufficient to shake them asunder. But if the particles be much larger, they then require the greater force of dissolving Menstruums to separate them, unless by any means the particles can be first broken into smaller ones. For the most fixed bodies, even Gold it self, some have said will become volatile only by breaking their parts smaller. Thus may the volatility & fixedness of bodies depend on the different sizes of their parts.

And on the same difference of size may depend the more or less permanency of aereal substances in their state of rarefaction. To understand this let us suppose ABCD to be a large piece of any metal, EFGH the
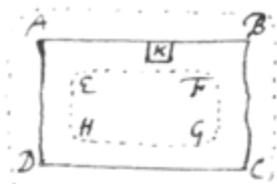
limit of the interior uniform æther, & K a part of the metal at the superficies AB. If this part or particle K be so little that it reaches not to the limit EF, its plain that the æther at its center must be less rare then if the particle were greater, for were it greater, its center would be further from the superficies AB, that is, in a place where the æther (by supposition) is rarer. The less the particle K therefore, the denser the æther at its center, because its center comes nearer to the edge AB where the æther is denser then within the limit EFGH. And if the particle were divided from the body & removed to a distance from it where the æther is still denser, the æther within it must proportionally grow denser. If you consider this you may apprehend how by diminishing the particle, the rarity of the æther within it will be diminished, till between the density of the æther without & the density of the æther within it there be little difference, that is till the cause be almost taken away which should keep this & other such particles at a distance from one another. For that cause, explained in the 4th & 5t suppositions, was the excess of density of the external æther above that of the internal. This may be the reason then why the small particles of vapors easily come together & are reduced back into water unless the heat which keeps them in agitation be so great as to dissipate them as fast as they come together: but the grosser particles of exhalations raised by fermentation keep their aerial form more obstinately, because the æther within them is rarer.

Nor does the size only but the density of the particles also conduce to the permanency of aereal substances. For the excess of density of the æther without such particles above that of the æther within them is still greater. Which has made me sometimes think that the true permanent Air may be of a <64v> metallic original: the particles of no substances being more dense then those of metals. This I think is also favoured by experience for I remember I once read in the Philosophical Transactions how M. Hugens at Paris found that the air made by dissolving salt of Tartar would in two or three days time condense & fall down again, but the air made by dissolving a metal continued without condensing or relenting in the least. If you consider then how by the continual fermentations made in the bowels of the earth there are aereal substances raised out of all kinds of bodies, all which together make the Atmosphere & that of all these the metallic are the most permanent, you will not perhaps think it absurd that the most permanent part of the Atmosphere, which is the true air, should be constituted of these: especially since they are the heaviest of all other & so must subside to the lower parts of the Atmosphere & float upon the surface of the earth, & buoy up the lighter exhalation & vapours to float in greatest plenty above them. Thus I say it ought to be with the metallic exhalations raised in the bowels of the earth by the action of acid menstruums, & thus it is with the true permanent air. For this as in reason it ought to be esteemed the most ponderous part of the Atmosphere

because the lowest: so it betrays its ponderosity by making vapors ascend readily in it, by susteining mists & clouds of snow, & by buoying up gross & ponderous smoke. The air also is the most gross unactive part of the Atmosphere affording living things no nourishment if deprived of the more tender exhalations & spirits that flote in it: & what more unactive & remote from nourishment then metallick bodies.

I shal set down one conjecture more which came into my mind now as I was writing this letter. It is about the cause of gravity. For this end I will suppose æther to consist of parts differing from one another in subtilty by indefinite degrees: That in the pores of bodies there is less of the grosser æther in proportion to the finer then in open spaces, & consequently that in the great body of the earth there is much less of the grosser æther in proportion to the finer then in the regions of the air: & that yet the grosser æther in the Air affects the upper regions of the earth & the finer æther in the earth the lower regions of the air, in such a manner that from the top of the air to the surface of the earth & again from the surface of the earth to the center thereof the æther is insensibly finer & finer. Imagin now any body suspended in the air or lying on the earth: & the æther being by the Hypothesis grosser in the pores which are in the upper parts of the body then in those which are in its lower parts, & that grosser æther being less apt to be lodged in those pores then the finer æther below, it will endeavour to get out & give way to the finer æther below, which cannot be without the bodies descending to make room above for it to go out into.

From this supposed gradual subtilty of the parts of æther some things above might be further illustrated & made more intelligible, but by what has been said you will easily discern whether in these conjectures there be any degree of probability, which is all I aim <65r> at. For my own part I have {so} little fansy to things of this nature that had not your encouragement moved me to it, I should never I think have thus far set pen to paper about them. What's amiss therefore I hope you will the more easily pardon in

<div style="text-align:center">

Your most humble Servant & honourer

Is. Newton.

</div>

Cambridge Feb 28.
1678989

<65v>

Philosophical Tract from Mr Isaac Newton. Cambridge. Feb. 28. 1678/9.

Towards Helmholtz's electron vortex from Kolmogorov's theory of turbulence, and introduction to matter creation process of Earth dynamics

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Abstract

In the present paper, these authors we discuss : a) how Hilbert's unification program failed completely, and b) we outline a new electron model based on Helmholtz's electron vortex and Kolmogorov theory of turbulence. Novel aspect: we discuss among other things, electron capture event, and von Karman vortex street and also Falaco soliton of RM Kiehn. We hope this research will lead to a new type of energy fusion technologies.

Introduction

First of all, it is known that Hilbert and Einstein were in race at 1915 to develop a new gravitation theory based on covariance principle.[1]

While Einstein seemed to win the race at the time, Hilbert produced two communications which show that he was ahead of Einstein in term of unification of gravitation theory and electromagnetic theory. Hilbert started with Mie's electromagnetic theory. However, as Mie theory became completely failed, so was the Hilbert's *axiomatic* program to unify those two theories [1].

Einstein might be learning from such an early failure of Hilbert to unify those theories, and years later returned to Mie theory.[1]

What we would say here is that Hilbert's axiomatic failure can be explained by virtue of Gödel's incompleteness theorem: which says essentially that any attempt to build a consistent theory based on axiomatic foundations can be shown to be inconsistent. Nonetheless only few physicists seem to grasp this result.

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What can we learn from that story?

First of all, it leads us back to Newton's *aether stream* model as will be discussed in the following sections.

Moreover, it may be not only that it is an elusive dream to unify gravitation and electromagnetic theories from pure thoughts, but it clearly shows that we ought to return to the old days of Maxwell and also Heaviside who have given hints on how to come up with a more realistic unification of gravitation and electromagnetic theories.

To us, it also shows that we may need to re-read Maxwell's original papers: perhaps we should find out how he thought about cogwheel, molecular vortices etc…and they may lead us to a correct theory of gravitation (and also how to connect it with *classical electrodynamics*). In the meantime, it is worth noting here that Tesla and other experimenters have tried to come up with a simpler version of such unification theories, although most of them were not as familiar to many physicists unlike General Relativity theory.

Enter Gödel's incompleteness theorem

Gödel's ground breaking results were obtained against the backdrop of the foundational debate of the 1920s. In 1921, reacting in part to calls for a "revolution" in mathematics by the intuitionist L. E. J. Brouwer and his own student Hermann Weyl, Hilbert had proposed a program for a new foundation of mathematics. The program called for (i) a formalization of all of mathematics in an axiomatic systems followed by (ii) a demonstration that this formalization is consistent, i.e., that no contradiction can be derived from the axioms of mathematics. Partial progress had been made by Wilhelm Ackermann and John von Neumann, and Hilbert in 1928 claimed that consistency proofs had been established for first-order number theory. Gödel's results would later show that this assessment was too optimistic; but he had himself set out to with the aim of contributing to this program.[5]

To tell Godel's monumental result, allow us to quote from Devlin:[4]

> "In 1931, a young Austrian mathematician published a paper that sent shock waves through the mathematical community and forced mathematicians to take a fresh look at their discipline. The mathematician was Kurt Gödel, and the result proved in his paper became known as the Gödel Incompleteness Theorem, or more simply Gödel's Theorem—although

it was by no means the only major theorem he proved during his highly successful career. He is also known as one of the inventors of the theory of recursive functions (which formed part of the foundation for computers).

Both of these major discoveries involved axiomatic systems, and neither can be properly understood without an appreciation of what mathematicians means by the word "axiom" and the role axioms play in mathematics. A misunderstanding of the nature of axioms is what lies behind a significant amount of nonsense that has been written about Gödel's Theorem over the years.

Gödel's Theorem says that in any axiomatic mathematical system that is sufficiently rich to do elementary arithmetic, there will be some statements that are true but cannot be proved (from the axioms). In technical terminology, the axiom system must be incomplete. At the time Gödel proved this theorem, it was widely believed that, with sufficient effort, mathematicians would eventually be able to formulate axioms to support all of mathematics. The Incompleteness Theorem flew in the face of this expectation, and many took it to imply that there is a limit to the mathematical knowledge we may acquire. Few mathematicians think that way now, however. The change in our conception of mathematical truth that Godel's theorem brought about was so complete, that today most of us view the result itself as merely a technical observation about the limitations of axiom systems." [4]

To summarize: "*Gödel's Incompleteness Theorem changed the concept of mathematical truth and showed the limitations of axiom-based systems.*" In other words, Godel effectively put Hilbert's axiomatic program into ruins. And so was Hilbert's approach to unify gravitation and electromagnetic theory. Now the hard question: is it possible to find a way outside such a Godel's spider web?

One of us (RNB) has an interpretation of Godel theorm in theoretical and mathematical physics:

"Without observations, experiences, and explorations and experiments, our mathematics and physics start to become non-physical fictions, fantasies, or lies. Physics concepts without physical evidence to support them, do not function well, in the engineering sense. In the sense of Godel, we can never know everything there is to know, intellectually. But we can **experience** everything, directly. That is the way out of Godel's Law. Then, a new kind of intellect develops, based on direct experiences and observations, in the moment.

Experiential intellect is superior to the analytical intellect, because it is based on the physical facts, the way things actually are, now, rather than abstractions based on the past. Nature functions based on experiential understandings, not abstractions.

Summarizing: The way out of Godel's Law is Direct Experience, which is keeping the attention only in the senses and sensitivities, without thinking. This is a form of meditation."

A plausible resolution: Basics of Helmholtz electron vortex

There are various models of electron which have been suggested, for instance see Chekh et al. [10]

But we seek a more realistic electron model which is able to describe to experiments conducted by Bostick et al. [9]. In our attempt to explain such experiments of electron creation in plasma, allow us to come up with a new model of electron, based on Helmholtz's electron vortex theory. In turn, we will discuss a plausible model of electron capture event inside Earth (matter creation), which in turn can serve a basis to explain

Le Sage/Laplace's push gravity. We will discuss its implications along with receding Moon effect in two forthcoming papers.

The Helmholtz vortex model of the electron as illustrated in the photo of a Helmholtz vortex (Fig. 1), is a toroid made of nested concentric toroidal flows of smaller particles, perhaps the inertons of Krasnoholovets, or aggregate particles made from Bhutatmas. (The "*Bhutatma*" infinitesimal particle of Vedic lore is the ultimate building block of everything, being the smallest unit of matter, and at the same time, the smallest unit of Consciousness.

Lines of constant flow are given by

r = **a** sin 'Ω = **a** sin 'Ωt,

where **a** is a constant. The velocity components are

dr/dt = **a** 'Ω cosine 'Ω t

 and

r dθ/dt = **a** 'Ω sin 'Ω t

The 'Ωt implies that a characteristic wave function is associated with the vortex, but we haven't worked on it yet. This may be an indication of origin of the de Broglie's wave of the electron, or it may have something to do with the Compton radius of the electron, or both.

The constant **a** may represent the outer limit of the vortex-particle, if the internal circulation velocity of smaller particles does not exceed light speed. If the circulation velocity is larger than c, at the outer shells of the nested vortex, there may be a species of sub-particles which is always being removed from the nested toroidal form, which must be replenished to the vortex which is living in an "atmosphere" made larger circulations of sub-particles. This is due to considering the electron as having a fixed

mass, a fixed extent, and a fixed charge (which may not be the case for all time and in all circumstances).

There should be some set of equations which shows vortex sub-particle replacement activities from the ambient aether, but we haven't worked on it either.

The first equation is a circle tangent to the z axis at the origin, with a center located in the X Y plane at the distance

a/2 = p

where p is the potential of the electron, and is independent of the orientation of the electron vortex.

Then the electron can be viewed as a toroid, with a volume

V = 2 π r times π r ^2 = 2 π^2 r^3

Three potentials are indicated here: Static potential, Spin potential, and a Dipole potential. Since the electron vortex has mass (which may change from its present value, according to the parameters of the ambient aether in the vicinity of the electron at the given place and time), a total of six potentials are implied.

Figure 1. electron vortex capture event – Helmholtz electron vortex is *nearly indestructible* (after R.N. Boyd)
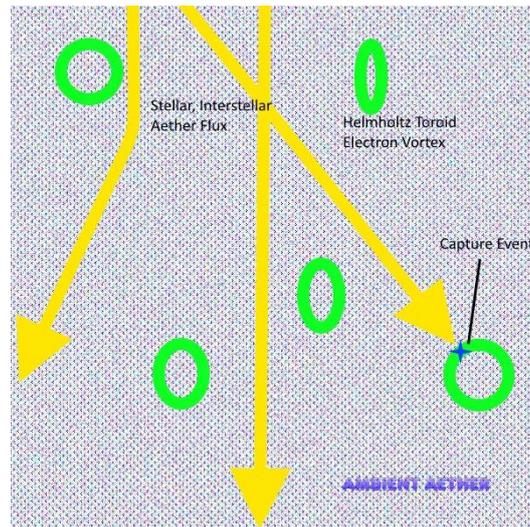
Figure 2. electron vortex capture event (after R.N. Boyd)
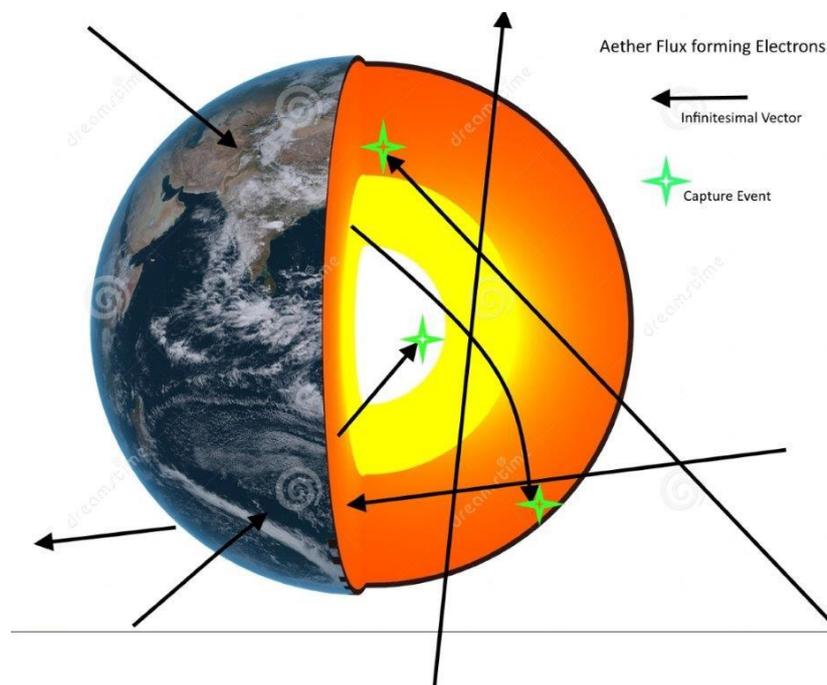
Figure 3. llustration on how matter creation can take place in inner core of Earth

(Source: https://www.dreamstime.com/royalty-free-stock-photography-earth-core-image1890727)

This illustration (Fig. 3) shows stellar and interstellar aether flows interacting with electron vortices. In some cases the stellar flux is diverted by the electron vortex. In

other cases, the flux entity misses entirely, similar to a neutrino. In some unusual cases the flux is captured by an electron vortex and participates in it for a while.

The illustrations were produced to show (electron) capture events of individual infinitesimals from the omni-directional aether fluxes which comprise, and cause, gravitation in the LeSage-LaPlace paradigm, to show how individual infinitesimals can be intercepted by electron vortices. The process of electron formation happens most often, due to vortex "street" events due to existing electron spheres, intersected by parallel aether flows, which can event-sourced, on occasion, or omni-directional, most of the time. So, although infinitesimal capture events are relevant, it seems at this moment, that the primary electron-positron pair creation events are due to *von Karman streets* of vortices of alternating directions, which will form vortex <u>rings</u>, when a directional aether flow (a sustained gust of aether wind) is impeded by an existing electron KH vortex sphere.

And, the most salient part of the KH electron vortex form, at its outermost margins, is almost **spherical**, as well as toroidal, as can be seen from the diagrams and the photograph of KH vortices. Thus, due to laminar flows intersecting with existing spheres, vortex streets are caused to form into KH vortex <u>rings</u>, which are rotating in alternating opposite directions. Electrons and positrons also have equal and opposite "charge" and are considered to be "*anti-matter*" in relation to one another.

But at this point, readers may ask: what is "anti-matter" really, other than opposite directions of rotation of similar particles? And what is "charge" really, in terms of aether behaviors?

So, essentially, electron-positron pair formation is properly described and justified for the first time in the history of particle physics, as both electrons and positrons are KH vortices, rotating in opposite directions. Electron-positron pairs are, at least temporarily, linked by bridges of the same material particles which the *e-p* particle pairs are being formed in.

This view may be related to Falaco Soliton vortex pairs as described and discussed by the late R.M. Kiehn [11][12][13][14], but it is not clear yet if this is actually a correct model when describing KH electron-positron pair formations.[1] See Figure 4.

Signal "on"

The Photon

2D Topological defects of zero mean curvature generated in the lightcone by isotropic Spinor eigenvalues of the 2-form, F = dA.

Signal "off"

The 1D topological defect where the evolution V in the direction of the 3-form A^F produces zero Work.

Example: V x B = 0, E = 0, B <> 0.

A "Vortex" line.
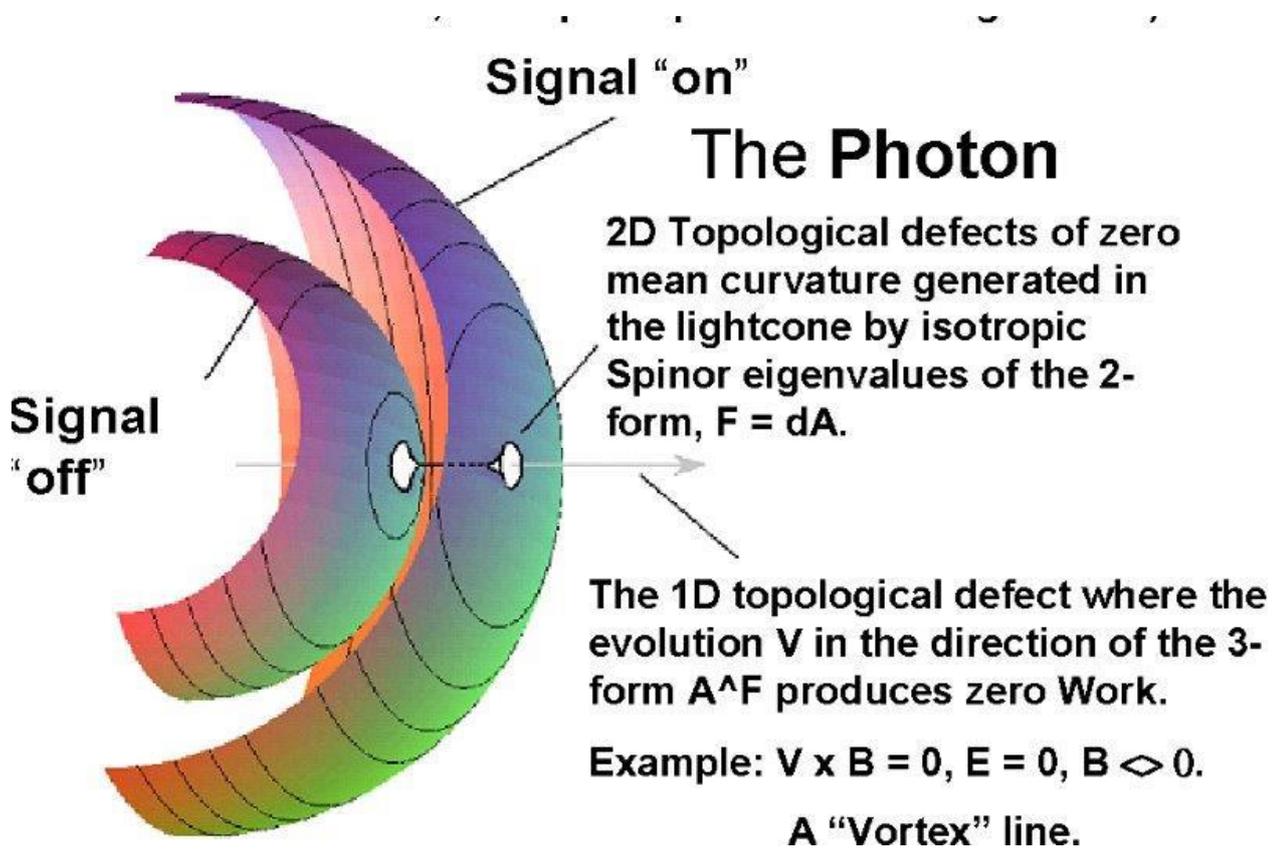
Figure 4. Photon bi-vortex in SQ Aether media (Falaco soliton model) (After: RN Boyd)

Pairs of electrons and positrons are required to make the larger particles, such as the proton, which is an agglomeration of an exact number of electrons and positrons, with one positron excess, to account for the positive charge produced by the proton.

What needs to be discovered here is: what property of the aether determines the exact numbers of electron-positron pairs, required to form protons and neutrons? Does this

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[1] Note by RNB: I brought it up with Kiehn, many years ago that electron-positron pairs might be Falaco Soliton pairs. He gave no response to that suggestion, which is not quite a good sign. But I tried to develop further his ideas.

have to do with "packing" limitations, imposed by the media? Is this to do with the phi ratio inherent in the media?

Each electron which already exists, acts as a large rock in a moving stream, causing deflections of the normal aether flow, slowing down the flow-rate, and producing eddy currents and turbulence in the ambient aether near the given electron. When the turbulence becomes large enough, additional electrons form in the media, which act to choke off the interstellar aether flow even more and impede its normally unencumbered motion. This is similar to adding more and more rocks into the channel of a stream of water, so that the flow rate of the water slows down, as more and more rocks are added.

This process was discovered by Nikola Tesla during his experiments at his Colorado Springs laboratory. It is a good thing this happens, or aether avalanches produced by Tesla's 100,000,000 volt explosive electrical discharge events could have burned away the very air we live in.

Tesla was relieved to find out the discharges were choked off, accompanied by vast numbers of newly created electrons. Tesla found the excess electricity resulting from the excess electrons to be a nuisance to his other experiments, so he dumped the excess electrical power into the earth's crust.

Relation between Helmholtz's electron vortex model and turbulence theory

Solving the turbulence problem means finding (unknown) laws of the mixing of momentum and scalars, at asymptotically high Reynolds numbers. About hundred years ago, Osborne Reynolds and soon also Friedman & Keller thought that we can solve the problem by series expansions of the Navier-Stokes equations, a process which provides dynamic equations of motion for higher and higher (statistical) moments.

Unfortunately, such an expansion does not visibly converge. Certain closure assumptions are needed, such that this approach is not strict. With respect to theory,

all subsequent research followed the paradigms of Reynolds, Friedman, and Keller, without any exact result.

The famous text by Landau & Lifshitz on fluid dynamics states that universal constants of turbulent motion, like von Karman's constant, can only be measured (rather than predicted by theoretical considerations).

Later, Kolmogorov realized the hopelessness of Reynolds-type paradigms and then he introduced an argument: *Similarity Analyses*, which immediately led to the scaling laws of turbulent spectra, e.g. the famous 5/3rd law, which is strict.

At an infinitely high Reynolds number, the physical properties of the specific fluid under study "vanish", due to vanishing viscosity. So the viscosity of the media at the given energy-density, is relevant, in aether considerations.

This sort of turbulence is consequently described by the (regularized) Euler equation, which represents an "inert geometry". By this, the turbulence problem rests on the Euler equation and its singular solutions, such as "vortex atoms", as first introduced by Lord Kelvin almost 200 years ago, based on von Helmholtz's vortex theorems. Such solutions can be treated as non-trivial three-dimensional particles, in motion.

In most cases these motions are extremely hard to predict are the focus of a special branch of mathematics – *topological hydrodynamics*.

There are two exceptions: Completely isolated vortices, and a "gas" of comprised of many vortices. The former case is trivial. In the latter case, one can do what has already been done by Maxwell in his kinetic theory of gases: Assume a chaotic (Brownian) motion of the entities involved. This paradigm, produces simple and comfortable equations of motion, of the advection-diffusion-reaction type, for the key variables of turbulence, turbulent kinetic energy, and r.m.s. vorticity.[2]

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[2] We're not sure this is going to work for aether considerations, but it might. See http://arxiv.org/abs/0907.0223.

This approach allows a theoretical prediction of von Karman's constant as $1/\mathrm{Sq}\ \mathrm{Rt}\ (2\pi)$ = 0.399 (The international standard value, based on measurements is 0.4).

This result is physically related to the Helmholtz vortex model of the electron. The correct aether turbulence model will produce electrons in the manner of a fluid flow producing turbulence.
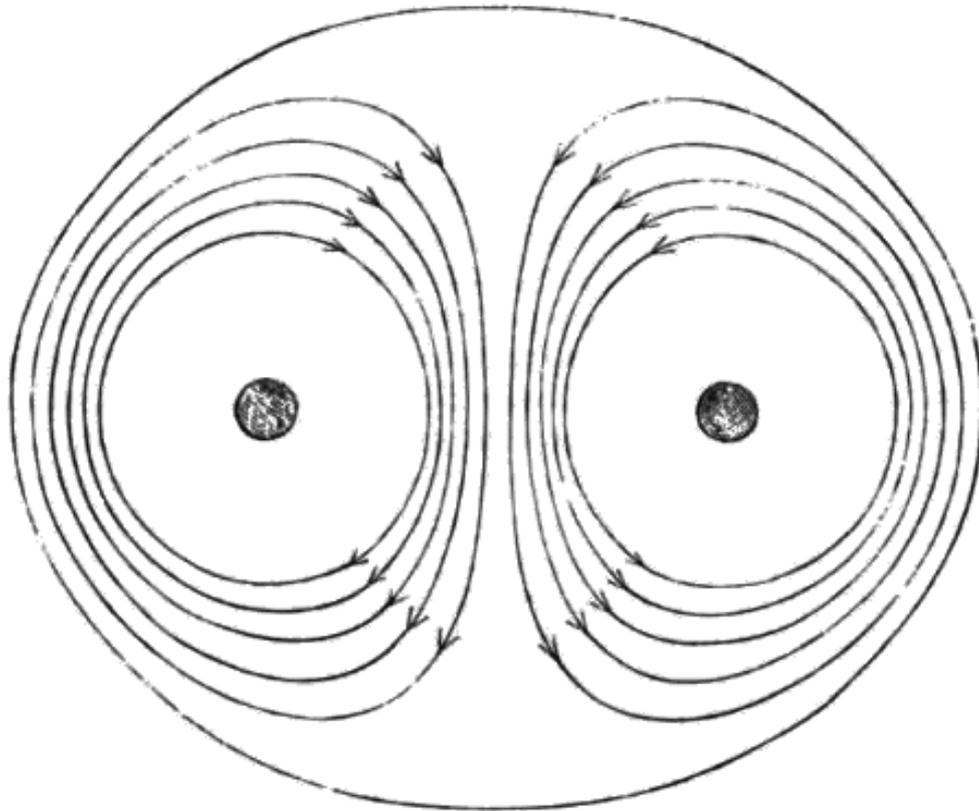
Figure 5. Helmholtz's atom model should be applied to electron vortex (after RN Boyd)

The form of the Helmholtz vortex is circular at the surface, with toroidal shells made from the same smaller particles, circulating internally.

This allows the "substructure" requested by the "ring model." The ring model is constrained to behave according to Einstein's version of relativity, by extraneous artifices and excuses, all of which are wrong, from my point of view. There is nothing

preventing **any** faster than light behaviors, other than Einstein's version of relativity, which is **completely non-physical**, and only functions internal to one's imagination.

One of the hugest mistakes ever made in physics was Einstein's ill-advised attempts to constrain everything in existence to light speed, including time. This causes a conceptual wall to be erected in the mind, which prohibits superluminal behaviors of any kind, and makes interstellar travel and power without fuel, impossible, just because of a mathematical fantasy that cannot be proved as valid by any manner of physical experiment. There are vast numbers and types of experiments which refute every part and portion of the irrational arguments of Einstein's version of relativity.

It seems a good idea is to combine the "ring model" of the electron with the Helmholtz vortex model of the electron. The conclusions of the ring model which finds the Dirac and Schrodinger's equations invalid, are just a few of the mistakes in the development of the ring model that need to be corrected in the Helmholtz model which allows that *superluminal* behaviors of every kind may participate.

On the plus side, they have done most of the other physics requirements work already. Once we provide the corrective measures which exclude relativistic considerations, we will have a very compelling model for the electron, which is based on nested flows of SubQuantum particles, which comprise a toroid when considered as a unit whole.

We think the completed toroidal electron model will be fully testable by various experiments. [3]

But, due to the work with Fabriciuss, in deriving the Kolmogorov vortex at $10e^{-58}$ m, corresponding towards Kolmogorov turbulence in a SubQuantum media, as the material and activity which forms the electron vortex, and the photon vortex, partly

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[3] Note by RNB: In addition, the relationship between photons and electrons may be corrected by this investigation. The model of the photon I developed with help from Ivars, was proved by experiment at Rutgers. The photon is a bi-vortex made of internal circulations of particles, which are each made from internal circulations of particles, and so on. I think the Kolmogorov Limit may be involved here.

because Ivars Fabriciuss and one of us (RNB) have already derived the 10e -58 meter Kolmogorov vortex. So the same logic may apply at larger scales.

Natural extensions of Kolmogorov's studies of turbulence, towards the infinitely small, have directly derived turbulence-generated vortices as small as **10e -58 m**, which we call Kolmogorov vortices. These are the smallest creatures which are still influenced by gravitation. Smaller creatures are the primary cause of gravitation, in this model, which is related to both the LaPlace and LeSage models of gravitation. Both these models are valid, depending on how one is looking at the situation, so we are combining them into one model. We also have reproducible experimental evidence and instrumented spacecraft observations, which physically support this model.

Fabriciuss suggested that multiple Kolmogorov vortices might form a geometric inter-relationship which would then comprise an electron.

The "Bhutatma" infinitesimal particle of Vedic lore is the ultimate building block of everything, being the smallest unit of matter, and at the same time, the smallest unit of Consciousness.

Once the errors are removed from the ring model, and we hope that soon we will be able to illustrate electron formation from Kolmogorov turbulence in a perfect fluid, then our Helmholtz vortex model will be excellent. An outline of such a model of electron creation will be discussed at the following section.

Turbulence origination of Kelvin-Helmholtz electron vortex from classical perspective

For a non-viscous fluid, pressure exerts a force of -grad p per unit volume. (There is also a gravitational aether force, ρg per unit volume.) The aether fluid obeys Newton's law of motion, so ρdv/dt = -grad p, as the equation of motion. (This is used to determine fluid pressure when the flow is known.)

A vorticity field is ω(x,y,z,t) in magnitude and direction, at any point. Lines drawn parallel to ω are called vortex lines, and their density can express the strength of the rotation, just as streamlines define the velocity field, and magnetic field lines define a magnetic field. (Such lines are not real, but greatly aid in visualization).

The line integral of the component of velocity, tangent to a closed curve, is called "circulation", and clearly measures the amount of rotation in the vortex. Let's take a small circle surrounding an area A = πr2 as the path of integration. If the angular velocity is ω, then the circulation will be 2πr x ωr = 2πωr2 = 2ωa. Thus, the circulation of the fluid, per unit area, is directly proportional to the angular velocity of rotation.

Stokes's Theorem states that the circulation of a vector about any curve C, is the surface integral of the curl (del cross) of the vector over the area enclosed by C. If this is applied to the present case, we find that curl v = 2ω, so that the rotation of the vortex is half the curl of the velocity. Since the divergence of the curl of a vector is identically zero, div ω = 0.

This means that if we consider a tube whose walls are parallel to ω, called a vortex tube, then this tube has the same "strength" (the product of the area and ω), at any point. This means that the vortex tube cannot end within the fluid, and must either close into a ring, or go to a boundary.

The Kelvin-Helmholtz theorem, states that the substantial derivative of the circulation about any curve C, in a fluid of zero viscosity, vanishes. This applies to any curve C on the walls of a vortex tube, or on any surface parallel to the vorticity, and implies that vortex lines are carried with the fluid, and that the "strength" at any point remains constant.

If the initial state of a fluid to which the KH theorem applies, has no rotation, that is, curl v = 0 everywhere, the fluid will remain irrotational as it moves. This also means that if rotation exists in the vortex, it will persist for all time.

The stream function in a fluid or gas is analogous to the use of the vector potential of the magnetic fields of electric currents. From this, the foundational basis of electromagnetism is actually a description of fluidic flows in the aether.

Consider a vector field A = kA(x,y). (A(x,y) may also vary with the time, but we will consider that later.) Suppose that v is derived from A by the rule v = curl A. Writing this out: $v = i(\partial A/\partial y) - j(\partial A/\partial x)$, so that $vx = \partial A/\partial y$ and $vy = -\partial A/\partial x$.

Now, writing out the continuity equation of div v = 0, it is automatically satisfied for any function A. To find the relationship between A and the vorticity, we write out the z-component of curl v, to find that $2\omega = \partial vy/\partial x - \partial vx/\partial y$ -div grad A.

In considering two-dimensional motions, the vorticity of the aether fluid can only be parallel to the z-axis, since the velocity must lie in the x y-plane and is independent of z. (The vector potential of a magnetic field satisfies the same equation, where the current takes the place of fluidic vorticity.) The above, is Helmholtz's equation. The one scalar function A, thus allows us to find two interrelated components of the fluid velocity.

If the aether flow is irrotational, then A will satisfy Laplace's equation, and solve the problem as well as the velocity potential φ . In fact, A and φ are conjugate functions. In two dimensions, they are the real and imaginary parts of a complex analytic function. The streamlines A = constant, are orthogonal to the equipotentials φ = constant, again pointing to the direct relation between fluidic aether flows and the Maxwell equations.

Vortex lines have been postulated to study fluid dynamics. A vortex line has a finite strength (vorticity times area), but zero area, similar to the understanding that a dipole has zero length. The resulting vortex lines tend to propagate at infinite velocity, unless the lines remain absolutely straight. (This would be the 5th aether phase state in *Mishin's 5-phase aetherdynamics*.)

Another property of the aether in its fluidic state, is a vortex sheet. To see what this is, imagine a horizontal interface between two horizontal winds of different velocity. If a

change in velocity takes place over a small interval, this is a good approximation to a vortex sheet. Helmholtz and Kelvin showed that such a sheet was unstable to small perturbations. The KH instability has actually been observed as being the cause of a disturbance called a Kelvin-Helmholtz's "wave".

Now *we are beginning to discover the origin of the various types of turbulences in the ambient aether flows which eventually manifest as KH electron vortices.* The aether flows around an already existing, but non-motional, electron vortex in a streaming aether fluid flow, sheds vortex pairs which are rotating in opposite directions, alternately from the two sides of the KH vortex, resulting in lines made of vortices, called a vortex "street" (also called a "*von Kármán street*"), behind it. These "streets" are seen on all scales, from flows in brooks, to the atmosphere, to the fluidic aether in which KH electron vortices eventually come into existence.
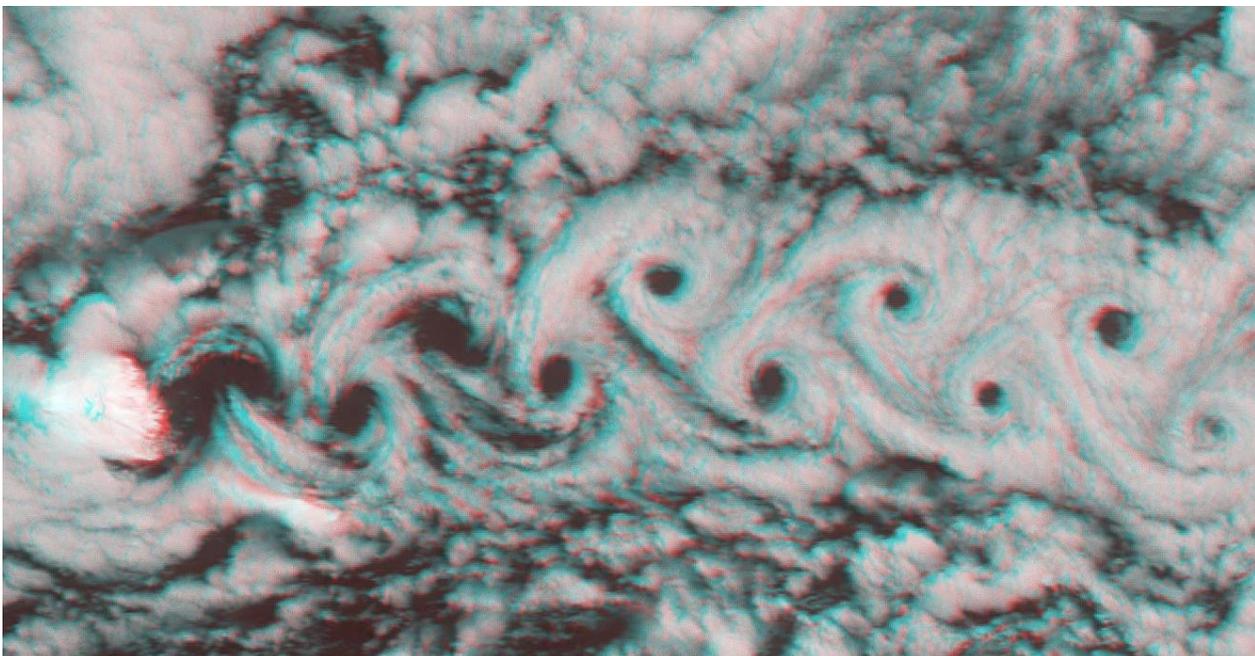
Figure 6. Illustration of von Karman street (source: [7], see also [8])

Alternating transverse forces can act on a cylinder, for example a telephone wire, which can make it vibrate. This is the reason why wires "sing" in the wind. The wire cylinder is stationary in a stream of moving media. Behind the cylinder is a turbulent wake of

slowed air. Two vortex sheets are formed on each side of the wake, and their instability results in the vortex streets (streams of vortices). Vortices are formed in a Kelvin-Helmholtz instability in the same way. Analogous effects occur in aether flows which pass around an existing electron sphere, but in this situation the resulting "street" of vortices form into rings, which are exactly many newly formed KH vortices.

Vortex "shedding" produces resonances with the object that impeded the flow. In this case, the vortices are resonant with the existing electron. This means the positron could be viewed as an "anti-resonant" particle. Resonance at this level will constrain the vortices in the "street" to form duplicates that are the same as the original forms, in terms of "aether mass" (constrained aether forms). This also implies that positrons can be the basis for the formation of new electrons, in the parallel aether stream. See figure 7.
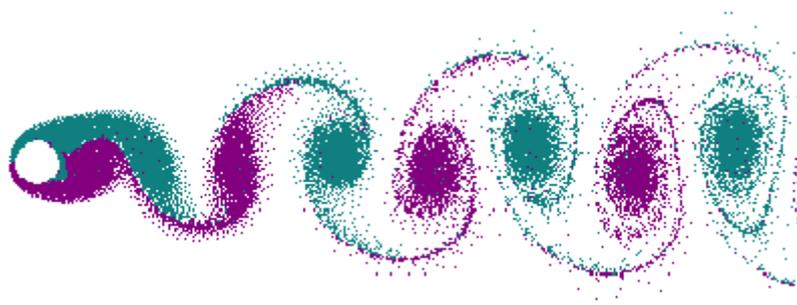
Figure 7. alternating electron-positron, alternating rotation directions (After RN Boyd)
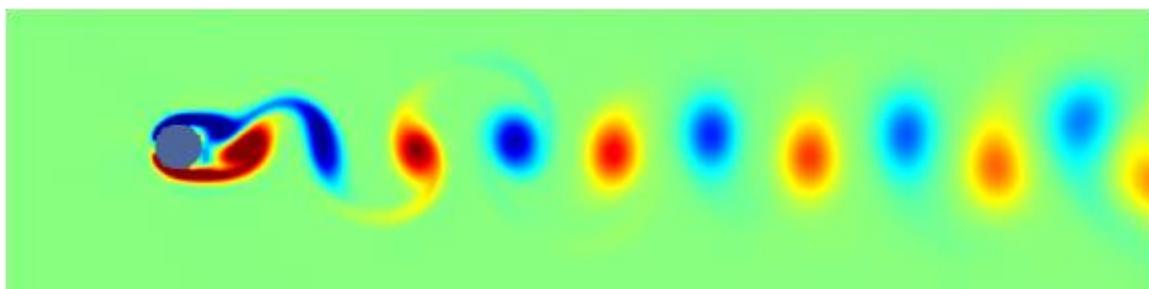
Figure 8. alternating electron-positron, (After RN Boyd)

The above figure 8 is an alternative version of Figure 7. This raises a number of questions: Does this imply that both positive and negative charges already both exist, internal to the aether which comprises the aether winds? This implies that behaviors of obstructed aether flows are the origination of the **cause** of the distinct <u>charges</u> of electrons and positrons, and of electrons and protons.

The KH vortex model of the electron is simultaneously a sphere, surrounding a nest of concentric smaller vortices, which have a vortex ring at the middle of the concentric aether flows which comprise the particle. So the ring model is only partially valid.

Concluding remarks

We begin with Hilbert's axiomatic program to unify electromagnetic and gravitation theory, and we remark that Godel's finding effectively put Hilbert program into ruins.

In the meantime, there are various models of electron which have been suggested, for instance see Chekh et al. 10]

But we seek a model which is close to experiments conducted by Bostick et al. [9]. In our attempt to explain such experiments of electron creation in plasma, allow us to come up with a new model of electron, based on Helmholtz's electron vortex theory. In turn, we will discuss a plausible model of electron capture event inside Earth (matter creation), which in turn can serve as a basis to explain Le Sage/Laplace's push gravity. We will discuss its implications along with receding Moon effect in two forthcoming papers. [4]

Summarizing, it is very significant to consider *matter creation* process in nature. For instance, one can begin by considering the correct presentation of Newton's third law is not F=ma, but F=d(mv)/dt=v(dm/dt) + m(dv/dt). In other words, it is possible of matter creation (dm/dt), and this is consistent with *Narlikar's work*.

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[4] Under preparation, to be presented in *EuroSciCon 2019* (Theme: Quantum and Plasma Physics).

We are also in the middle of preparing a joint book on this topic along with Dr. Robert Neil Boyd and Dr. Slobodan Nedic, on Laplace model of gravitation and also aetherdynamics theory, so we can expect some new results later. The title of the upcoming book is: *Going beyond Tesla.*

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Version 1.2: 25/11/2018, pk. 15:02

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Chapter 3

On the origin of macroquantization in astrophysics and celestial motion[5]

V. CHRISTIANTO

ABSTRACT. Despite the use of Bohr radius formula to predict celestial quantization has led to numerous verified observations, the cosmological origin of this macroquantization remains an open question. In this article various plausible approaches are discussed. Further observation to verify or refute this proposition is recommended, in particular for exoplanets.

RÉSUMÉ: En dépit de l'utilisation de la formule de rayon de Bohr de prévoir la quantification céleste a mené aux nombreuses observations vérifiées, l'origine cosmologique de ce macroquantization est une question en suspens. En cet article de diverses approches plausibles sont discutées. Promouvez l'observation pour vérifier ou réfuter cette proposition est recommandée, en particulier pour des exoplanets.

1 Introduction

It is known that the use of Bohr radius formula [1] to predict celestial quantization has led to numerous verified observations [2][3]. This approach was based on Bohr-Sommerfeld quantization rules [4][5]. Some implications of this quantum-like approach include exoplanets prediction, which has become a rapidly developing subject in recent years [6][7]. While this kind of approach is not widely accepted yet, this could be related to a recent suggestion to reconsider Sommerfeld's conjectures in Quantum Mechanics [8].

While this notion of macroquantization seems making sense at least in the formation era of such celestial objects, i.e. "*all structures in the Universe, from superclusters to planets, had a quantum mechanical origin in its earliest moments*" [9], a question arises as to how to describe the physical origin of wave mechanics of such large-scale structures [5].

A plausible definition of the problem of quantization has been given by Grigorescu [10]: "select an infinite, discrete number of quantum possible real motions, from the continuous manifold of all mechanically possible motions." While this quantization method has been generally acceptable to describe physical objects at molecular scale, there is not much agreement why shall we also invoke the same notion to describe macrophenomena, such as celestial orbits. Nonetheless, there are plenty efforts in the literature in attempt to predict planetary orbits in terms of wave mechanics, including a generalisation of Keplerian classical orbits [11].

In this article we discuss some plausible approaches available in the literature to describe such macroquantization in astrophysics, in particular to predict celestial motion:

 a. Bohr-Sommerfeld's conjecture;
 b. Macroquantum condensate, superfluid vortices;
 c. Cosmic turbulence and logarithmic-type interaction;
 d. Topological geometrodynamics (TGD) approach.

While these arguments could be expected to make the notion of macroquantization a bit reasonable, it is beyond the scope of this article to conclude which of the above arguments is the most consistent with the observed data. There is perhaps some linkage between all of these plausible arguments. It is therefore recommended to conduct further research to measure the reliability of these arguments, which seems to be worthwhile in our attempt to construct more precise cosmological theories.

2 Bohr-Sommerfeld's quantization rules

In an attempt to describe atomic orbits of electron, Bohr proposed a conjecture of quantization of orbits using analogy with planetary motion. From this viewpoint, the notion of macroquantization could be considered as returning Bohr's argument back to the celestial orbits. In the meantime it is not so obvious from literature why Bohr himself was so convinced with this idea of planetary quantization [12], despite such a conviction could be brought back to Titius-Bode law, which suggests that celestial orbits can be described using simple series. In fact, Titius-Bode were also not the first one who proposed this kind of simple series [13], Gregory-Bonnet started it in 1702.

In order to obtain planetary orbit prediction from this hypothesis we could begin with the Bohr-Sommerfeld's conjecture of quantization of angular momentum. As we know, for the wavefunction to be well defined and unique, the momenta must satisfy Bohr-Sommerfeld's quantization condition [14]:

$$\oint_{\Gamma} p.dx = 2\pi.n\hbar \qquad (1)$$

for any closed classical orbit Γ. For the free particle of unit mass on the unit sphere the left-hand side is

$$\int_0^T v^2.d\tau = \omega^2.T = 2\pi.\omega \qquad (2)$$

where $T=2\pi/\omega$ is the period of the orbit. Hence the quantization rule amounts to quantization of the rotation frequency (the angular momentum): $\omega = n\hbar$. Then we can write the force balance relation of Newton's equation of motion:

$$GMm/r^2 = mv^2/r \qquad (3)$$

Using Bohr-Sommerfeld's hypothesis of quantization of angular momentum (2), a new constant g was introduced:

$$mvr = ng/2\pi \qquad (4)$$

Just like in the elementary Bohr theory (before Schrödinger), this pair of equations yields a known simple solution for the orbit radius for any quantum number of the form:

$$r = n^2.g^2/(4\pi^2.GM.m^2) \qquad (5)$$

or

$$r = n^2.GM/v_o^2 \qquad (6)$$

where r, n, G, M, v_o represents orbit radii (semimajor axes), quantum number (n=1,2,3,…), Newton gravitation constant, and mass of the nucleus of orbit, and specific velocity, respectively. In this equation (6), we denote

$$v_o = (2\pi/g).GMm \qquad (7)$$

The value of m is an adjustable parameter (similar to g).

Nottale [1] extends further this Bohr-Sommerfeld quantization conjecture to a gravitational-Schrödinger equation by arguing that the equation of motion for celestial bodies could be expressed in terms of a scale-relativistic Euler-Newton equation. For a Kepler potential and in the *time independent* case, this equation reads (in Ref [1c] p. 380):

$$2D^2\Delta\Psi + (E/m + GM/r).\Psi = 0 \qquad (8)$$

Solving this equation, he obtained that planetary orbits are quantized according to the law:

$$a_n = GMn^2/v_o^2 \qquad (9)$$

where a_n,G,M,n,v_o each represents orbit radius for given n, Newton gravitation constant, mass of the Sun, quantum number, and specific velocity (v_o=144 km/sec for Solar system and also exoplanet systems), respectively. These equations (8)-(9) form the basis of Nottale's Scale Relativity prediction of planetary orbits [1]; and equation (9) corresponds exactly with equation (6) because both were derived using the same Bohr-Sommerfeld's quantization conjecture. Another known type of observed quantization in astronomy is Tifft's 72 km/sec quantization [13].

3   Macroquantum condensate, superfluid vortices

Provided the above Bohr-Sommerfeld description of macroquantization corresponds to the facts, then we could ask further what kind of physical object could cause such orbital quantization. Thereafter we could come to the macroquantum condensate argument. In this regard, astrophysical objects could be seen as results of vacuum condensation [15][16]. For instance Ilyanok & Timoshenko [17] took a further step by hypothesizing that the universe resembles a large Bose Einstein condensate, so that the distribution of all celestial bodies must also be quantized. This conjecture may originate from the fact that according to BCS theory, superconductivity can exhibit macroquantum phenomena [18]. There is also a known suggestion that the vacua consist of hypercrystalline: *classical spacetime coordinate and fields are parameters of coherent states* [19].

It is perhaps interesting to remark here that Ilyanok & Timoshenko do not invoke argument of *non-differentiability* of spacetime, as Nottale did [1]. In a macroquantum condensate context, this approach appears reasonable because Bose-Einstein condensate with Hausdorff dimension $D_H\sim2$ could exhibit fractality [20], implying that non-differentiability of spacetime conjecture is not required. The same fractality property has been observed in various phenomena in astrophysics [21], which in turn may also correspond to an explanation of the origin of multifractal spectrum as described by Gorski [22]. In this regard, Antoniadis *et al.* have discussed CMBR temperature (2.73° K) from the viewpoint of conformal invariance [23], which argument then could be related to Winterberg's hypothesis of superfluid Planckian phonon-roton aether [24].

Based on previous known analogy and recent research suggesting that there is neat linkage between gravitation and condensed matter physics [25][26], we could also hypothesize that planetary quantization is related to quantized vortex. In principle, this

hypothesis starts with observation that in quantum fluid systems like superfluidity, it is known that such vortexes are subject to quantization condition of integer multiples of 2π, or $\oint v_s.dl = 2\pi.n\hbar/m_4$. Furthermore, such quantized vortexes are distributed in equal distance, which phenomenon is known as vorticity [4]. In large superfluid system, usually we use Landau two-fluid model, with normal and superfluid component. The normal fluid component always possesses some non-vanishing amount of viscosity and mutual friction. Similar approach with this proposed model has been considered in the context of neutron stars [27], and this quantized vortex model could also be related to Wolter's vortex [28].

4 Cosmic turbulence and logarithmic type interaction

Another plausible approach to explain the origin of quantization in astronomy is using turbulence framework. Turbulence is observed in various astrophysical phenomena [21], and it is known that such turbulence could exhibit a kind of self-organization, including quantization.

Despite such known relations, explanation of how turbulence could exhibit orbital quantization is not yet clear. If *and only if* we can describe such a flow using Navier-Stokes equation [29], then we can use R.M. Kiehn's suggestion that there is exact mapping from Schrödinger equation to Navier-Stokes equation, using the notion of quantum vorticity [30]. But for fluid which cannot be described using Navier-Stokes equation, such exact mapping would not be applicable anymore. In fact, according to Kiehn the Kolmogorov theory of turbulence is based on assumption that the turbulent state consists of "vortices" of all "scales" with random intensities, but it is not based on Navier-Stokes equation explicitly, in fact *"the creation of the turbulent state must involve discontinuous solutions of Navier-Stokes equations."* [31] However, there is article suggesting that under certain conditions, solutions of 3D Navier-Stokes equation could exhibit characteristic known as Kolmogorov length [32]. In this kind of hydrodynamics approach, macroquantization could be obtained from solution of diffusion equation [33].

In order to make this reasoning of turbulence in astrophysics more consistent with the known analogy between superfluidity and cosmology phenomena [26], we could also consider turbulence effect in quantum liquid. Therefore it seems reasonable to consider *superfluid turbulence* hypothesis, as proposed for instance by Kaivarainen [34]. There are also known relations such as discrete scale invariant turbulence [35], superstatistics for turbulence [36], and conformal turbulence. Furthermore, such a turbulence hypothesis could lead to logarithmic interaction similar to Kolmogorov-type interaction across all scales [28].

Another way to put such statistical considerations into quantum mechanical framework is perhaps using Boltzmann kinetic gas approach. It is known that quantum mechanics era began during Halle conference in 1891, when Boltzmann made a remark: *"I see no reason why energy shouldn't also be regarded as divided atomically."* Due to this reason Planck subsequently called the quantity $2\pi\hbar$ after Boltzmann – 'Boltzmann constant.' Using the same logic, Mishinov *et al.* [37] have derived Newton equation from TDGL:

$$m*d_tV_p(t) = e*.E - m*V_p(t)/\tau_p \quad (10)$$

This TDGL (time-dependent Ginzburg-Landau) equation is an adequate tool to represent the *low-frequency* fluctuations near T_c, and it can be considered as more universal than GPE (Gross-Pitaevskii equation).

5 TGD viewpoint on the origin of macroquantization in astrophysics and celestial motion

Topological geometrodynamics (TGD) viewpoint on this macro-quantization subject [38] was based on recognition that this effect could be considered as simple substitution of Planck constant:

$$\hbar \to \hbar_{gr} = GMm/v_0 \quad (11)$$

provided we assert that $\hbar = c = 1$. The motivation is the earlier proposal inspired by TGD [39] that the Planck constant is dynamical and quantized. As before $v_o=144.7\pm0.7$ km/sec, giving $v_0/c = 4.82x10^{-4} km/\sec$. This value is rather near to the peak orbital velocity of stars in galactic halos. As a sidenote, this is not the only plausible approach to make extension from geometrodynamics to Planck scale, and *vice versa* [41].

A distinction of TGD viewpoint [42] from Nottale's fractal hydrodynamics approach is that many-sheeted spacetime suggests that astrophysical systems are not only quantum systems at larger space-time sheets but correspond to a gigantic value of gravitational Planck constant. The Bohr's rules for the visible matter reflect the quantum dynamics of the dark matter at larger space-time sheets. Furthermore, TGD predicts the value of the parameter v_o appearing in equation (9) and explains its harmonic and subharmonics. There is also a plausible linkage between hydrodynamics approach and Kähler structure to describe the Schrödinger equation [43].

5.1. Consistency with TGD based model of galactic dark matter

The first step is to see whether the TGD based model for dark matter is consistent with the gravitational Schrödinger equation. The following argument was based on Bohr quantization rules [41].

a. The gravitational potential energy V(r) for a mass distribution M(r)=xTr (T denotes string tension) is given by:

$$V(r) = Gm \int_r^{R_o} M(r).dr / r^2 = GmxT \log(r/R_o) \qquad (12)$$

Here R_o corresponds to a large radius so that the potential is negative, as it should in the region where binding energy is negative.

b. The Newton equation for circular orbit:

$$mv^2 / r = GmxT / r \qquad (13)$$

which gives

$$v = xGT \qquad (14)$$

c. Bohr quantization condition for angular momentum by equation (11) reads as

$$mvr = n\hbar_{gr} \qquad (15)$$

and gives:

$$r_n = n\hbar_{gr} /(mv) = n.r_1 \qquad (16)$$

$$r_1 = GM /(vv_o) \qquad (17)$$

where v is rather near to v_o.

d. Bound state energies are given by

$$E_n = mv^2 / 2 - xT \log(r_1 / R_o) + xT \log(n) \qquad (18)$$

The energies depend only weakly on the radius of the orbit.

e. The centrifugal potential $l(l+1)/r^2$ in the Schrödinger equation is negligible as compared to the potential term at large distances so that one expects that degeneracies of orbits with small values of *l* do not depend on the radius.

5.2. TGD based model of planetary system

The magnetic flux quanta (shells and flux tubes) are the carriers of the quantum coherent dark matter and behave effectively like quantum rigid bodies. This leads to a simple model for the generation of planetary system via a breaking of rotational symmetry. For inner planets this process leads from spherical shells with a full rotational symmetry to flux tubes with reduced rotational symmetry inside with planet are eventually formed. Earth and outer planets were formed by a splitting of a flattened flux tube in the common orbital plane to 5 flux tubes corresponding to Earth and outer planets except Pluto, which indeed has orbital parameters differing dramatically from those of other planets. The replacement of v_o by its subharmonic $v_o/5$ for these Jovian planets corresponds topologically to the splitting of a magnetic flux tube to five separate tubes.

Flux tubes and spherical cells containing quantum dark matter are predicted to be still there. The amazing finding is that the quantum time scales associated with Bohr orbits seem to correspond to important *biological* time scales. For instance, the time scale

$$T = \hbar_{gr} / E \qquad (19)$$

associated with n=1 orbit is precisely 24 hours. This apparently supports the prediction of TGD based theory of living matter in with quantum coherent dark matter plays a fundamental role [40].

The inclinations of planetary orbits could be a test problem for the hypothesis outlined above. The prediction is not merely statistical like the predictions given by Nottale and others [1d][1e]. The minimal value of inclination for a given principal quantum number n follows from semiclassical view about angular momentum quantization for maximal value of z-component of angular momentum m=j=n [38]:

$$\cos(\phi) = n / \sqrt{n(n+1)} \qquad (20)$$

where ϕ is the angle between angular momentum and quantization axis and thus also between orbital plane and (x,y)-plane. This angle defines the tilt angle between the orbital plane and (x,y)-plane. For n=3,4,5 (Mercury, Earth, Venus) this equation gives $\phi = 30.0^o, 26.6^o, 24.0^o$ respectively. Only the relative tilt angle can be compared with the experimental data. Taking Earth's orbital plane as reference will give 'inclination' angle, i.e. 6 degrees for Mercury, and 2.6 degrees for Venus. The observed values are 7.0 and 3.4 degrees, respectively, which are in good agreement with prediction.

Bohr-Sommerfeld rules allow also estimating eccentricities and the prediction is [38]:

$$e^2 = 2.(\sqrt{1 - m^2 / n^2}) /(1 + \sqrt{1 - m^2 / n^2}) \qquad (21)$$

The eccentricities are predicted to be very large for m<n unless n is very large and the only possible interpretation is that planets correspond in the lowest order approximation to m=n and e=0 whereas comets with large eccentricities could correspond to m<n orbits.

In particular, for m<n comets in Oort Clouds (n<700) the prediction is e>0.32. This could be a good test problem for further astronomical observation.

Concluding remarks

In this article, some plausible approaches to describe the origin of macroquantization in astrophysics and also celestial motion are discussed. While all of these arguments are interesting, it seems that further research is required to verify which arguments are the most plausible, corresponding to the observed astrophysics data.

After all, the present article is not intended to rule out the existing methods in the literature to predict quantization of celestial motion, but instead to argue that perhaps this macroquantization effect in various astronomy phenomena requires a new kind of theory to describe its origin.

Acknowledgement

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An indirect "proof" on how string theory can cure influenza (in 2 years or so)

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Introduction
You may have heard that the string and superstring theories and their variations are our only hope toward Unification of all interactions, and may be TOE. Some mathematician-physicists have tried to make these theories the only game in town, and even they wrote a textbook on string theory for highschool students.
But you may also know that flu remains one of unsolved problem in medicine. Can string theory solve it? Let's find out.

A hypothetical scenario
Let say one day a smart mathematical-physicist wakes up in the morning, to find himself got a bad influenza.
But being a smart mathematician, he refuses to take medication or visit a doctor, but he decides to use his mathematical prowess, especially in string theory he recently got interested in.
So what is his option?

Here is a series of simple steps on how string theory can cure influenza in 3 years or less.
Note: be careful what you wish for...

Steps to be taken:
1. Get your feet wet in basic concepts of general relativity. Approximately: 2 months
2. Get acquaintance in basic concepts of quantum mechanics. Approximately: 4 months (harder)
3. Study various ways to combine general relativity and quantum mechanics, including Rovelli's quantum gravity. Approximately: 4 months (harder)
4. Learn the basics of mathematics of string theory, including Regge calculus, Verysorry algebra and all that. Approximately: 4 months (if you are rarely smart)
5. Then begin exploring basics of string theory including 26 dimensional bosonic string. Approximately: 4 months (almost impossible to comprehend, but alright you can try).
6. Apply your precious new knowledge to find how to decipher the structure of influenza. Approximately: 4 months. But then you get stuck and don't know what to do.
7. That is already 2 years. And chance is, it is highly probable that by two years, your influenza has been gone. Problem solved. QED

That is my indirect"proof", or a sort of. ;-)

Concluding remarks
Hopefully you find this "proof" is at least amusing to ponder.
To fellow physicists, my apology for the satiric tune of this article. This article is inspired by an older joke paper on string and influenza, which I cannot find anymore by googling. If someone has a copy of such an article, would you be so kind to send it to : victorchristianto@gmail.com

Version 1.0: 11 october 2018, pk. 15:39
VC

PS: for readers with more serious attitude, you can check some references below:
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From Self-Dual Yang-Mills theory to Modified-KdV Equation to Soliton Cellular Automata

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ABSTRACT

The present paper is a follow up of our previous title: "An outline of cellular automaton universe via cosmological KdV equation," as published recently by IOP Conference series. Besides, this paper was inspired by (a) Feynman's checkerboard solution to 1+1 dimensional Dirac equation, and (b) recent work of Prof. Gerard 't Hooft on possible reformulation of QM into classical cellular automata language. In fact, after one of us (VC) communicated our cited paper to him, he gave a short remark: "*Much more understanding of the fundamental particles is needed before one can try to imagine the CA rule(s) for our universe.*" Therefore, now we hope to formulate our ideas on cellular automaton model in microworld context. While these approaches (soliton cellular automata etc) may have been known for long time in other fields of physics, their roles in understanding elementary particles have not been discussed quite often. It is our hope, that these new approaches will find their ways to experimental vindications.

Keywords: Self-Dual Yang-Mills theory, Modified KdV equation, Soliton Cellular Automata

Introduction

There are many literatures which discuss that Self-Dual Yang Mills (SDYM) theory reduces to Korteweg-deVries equation [4], but recently Shehata and Alzaidy have proved that SDYM reduces to modified KdV equation [2]. In a similar tone, one of these authors (VC) has obtained exact numerical solution of mKdV equation [3].

Now, in this paper we will give an outline from Self-Dual Yang Mills (SDYM) theory reduces to modified Korteweg- deVries equation, and from m-KdV to soliton cellular automata. The main purpose of this paper is to describe new possibility to describe hadron and elementary particles in cellular automata picture, beyond what has been discussed in 't Hooft's paper.[5]

From Self-Dual Yang-Mills to m-KdV equation

It has been shown since 1990s that many, and possibly all, integrable systems can be obtained by dimensional reduction of self-dual Yang Mills. Moreover, according to Schiff [4] a remarkable piece of

evidence for this was produced a few years ago by Mason and Sparling, who showed how to obtain the Korteweg-de Vries (KdV) and Nonlinear Schrodinger (NLS) equations from SDYM. In this regard, it seems very interesting that A.R. Shehata and J.F. Alzaidy were able to reduce SDYM to mKdV equation in their 2011 paper.[2]

SDYM can be written in compact form as follow [2]:

$$P_t + [P, R] = 0,$$
$$R_x - Q_t - [Q, R] = 0. \tag{1}$$

From which, Shehata and Alzaidy obtain mKdV equation as follows:

$$u_t + 6u_x u^2 + u_{xxx} = 0. \tag{2}$$

A numerical solution of the above mKDV system has been presented in [3]. In the next section, we will discuss how to translate mKdV equation into soliton Cellular automata.

m-KdV equation reduces to Soliton Cellular Automata

According to Tsujimoto & Hirota, there is a discrete formulation of mKdV which can be written as follows [6]:

$$\frac{\upsilon_j^{t+1}(1 + \delta\upsilon_{j+1}^{t+1})}{1 + a\upsilon_j^{t+1}} = \frac{\upsilon_j^t(1 + \delta\upsilon_{j-1}^t)}{1 + a\upsilon_j^t} \qquad \text{Moreover,}$$

Takahashi & Makudaira are able to show that d-mKdV equation can reduce to an ultradiscrete mKdV (u-mKdV) equation under appropriate transformations of variables and limit. Then, we show that the u-mKdV equation is related to an extended version of BBS introducing a carrier of balls. And they also discuss a structure of N-soliton solutions of the system. [6]

Pawel Siwak also discusses filtrons, or discrete solitons, as the substring of a string, which exhibit soliton like properties. Then, he identifies Mealy automata that are equivalent to such models as Soliton Cellular Automata. [7] See also Kakei et al. [8].

What is more interesting to remark here, is that our microworld picture of soliton cellular automata allows us to consider quantization, beyond the standard formalism of Hilbert space.[9] This would mean a realization of 't Hooft's vision to reformulate QM into CA language. We hope to explore this topic in future paper.

Concluding remarks

Summarizing, in this paper we gave an outline from Self-Dual Yang Mills (SDYM) theory reduces to modified Korteweg- deVries equation, and from m-KdV to soliton cellular automata. The main purpose of

this paper is to describe new possibility to describe hadron and elementary particles in a soliton cellular automata picture, beyond what has been discussed in 't Hooft's paper.

What is more interesting to remark here, is that our microworld picture of soliton cellular automata allows us to consider quantization, beyond the standard formalism of Hilbert space.[9] This would mean a realization of 't Hooft's vision to reformulate QM into CA language. We hope to explore this topic in future paper.

While we admit that our model is in sketch phase, it is our hope that these new approaches can be found useful in studying mKDV/soliton cellular automata models of elementary particles by computer simulations.

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Chapter 6

A Review of Two New Approaches of Tunneling and Their Potential Roles in CMNS

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ABSTRACT

In this paper, we review two new approaches of tunneling which may be found interesting in the context of CMNS, i.e. (a) Aharonov-Bohm electrodynamics and coherent tunneling, (b) soliton catalysis through Kadomtsev-Petviashvili equations. While these approaches may have been known in other fields of physics, their roles in enhancing CMNS have not been discussed quite often. It is our hope, that these new approaches will find their ways to experimental vindications.

Introduction

There are many literatures which have discussed how to enhance tunnelling in low energy fusion reaction (CMNS). But few have discussed Aharonov-Bohm electrodynamics and also possible advantage of soliton catalysis, which are our focus in this short review.

Aharonov-Bohm electrodynamics and coherent tunnelling

An extension of Maxwell theory which is compatible with additional degrees of freedom in electromagnetic waves in vacuum is the Aharonov-Bohm electrodynamics. The Aharonov-Bohm equations, however, set a clear limit to their own application when one considers the wave equation with sources. As already remarked in [4], this equation implies that a scalar electromagnetic field S can only be generated by a source which does not respect the local charge conservation condition.

The extended electrodynamic theory introduced by Aharonov and Bohm (after an earlier attempt by Ohmura) and recently developed by Van Vlaenderen and Waser, Hively and Giakos, can be re-written and solved in a simple and effective way in the standard covariant 4D formalism. This has been done recently by Giovanni Modanese, and will be reviewed shortly in this section.

Under a gauge transformation, the Aharonov-Bohm Lagrangian changes as follows [1]:

$$\Delta L_{A\text{-}B} = j_\mu(\partial^\mu \phi) + \frac{1}{2}\gamma(\partial^\alpha \partial_\alpha \phi)^2 + 2(\partial^\alpha A_\alpha)(\partial^\alpha \partial_\alpha \phi). \tag{1}$$

This means that the theory is not gauge-invariant anymore.

Therefore the generalized Maxwell equations (7) can be rewritten as follows:

$$\partial_\mu F^{\mu\nu} = j^\nu + i^\nu, \tag{2}$$

$$i^\nu = -\partial^\nu \partial^{-2}(\partial^\beta j_\beta). \tag{3}$$

Summarizing, we can say that the input of the generalized electrodynamic equations (2-3) is a four current j_ν which is not necessarily conserved (computed, for instance, from an "anomalous" microscopic model, as discussed in the following); but the output is an electromagnetic field tensor $F^{\mu\nu}$ which has the usual properties, including that of being generated by a conserved current. It follows the important property that at the macroscopic level the current is always conserved, as far as it is possible to measure it through the field it generates. In other words, even though in this model the microscopic current j_ν can be not locally conserved, the observable current is always conserved. [1]

According to Modanese, in condensed matter systems, macroscopic wave functions obey constrained equations and have therefore in general a non-locally conserved current. In other words, the equations (2)-(3) above may be found useful also in condensed matter nuclear science (CMNS) context. This proposition, however, needs to be verified in experiments.

Kadomtsev-Petviashvili equations and soliton catalysis

Most scientific problems and physical phenomena occur nonlinearly. In the past two decades, the discovery of soliton solutions for certain (1+1)-dimensional nonlinear evolution equations with physical applications has aroused great interest and attention among physicists and mathematicians. [3]

Kadomtsev-Petviashvili (KP) equations are universal models for dispersive, weakly nonlinear waves, which are essentially one-dimensional, when weak transverse effect are taken into account. The KP equation originates from a 1970 paper by two Soviet physicists, Boris Kadomtsev and Vladimir Petviashvili. The two researchers derived the equation that now bears their name as a model to investigate the evolution of long ion acoustic waves of small amplitude propagating in plasmas under the effect of long transverse perturbations. In the absence of transverse dynamics, this problem is explained by the Korteweg-de Vries (KdV) equation. The KP equation was soon widely accepted as a natural extension of the classical KdV equation to two spatial dimensions, and was later derived as a model for surface and internal water waves.[3]

This equation is a nonlinear partial differential equation in two spatial and one temporal coordinate which describes the evolution of nonlinear, long waves of small amplitude with slow dependence on the transverse coordinate. There are two distinct versions of the KP equation, which can be written in normalized form as follows:

$$(u_t + 6uu_x + u_{xxx})_x + 3\sigma^2 u_{yy} = 0. \tag{4}$$

Interestingly, Kalinowski has argued that KP equations may also be useful in studying cold fusion process (CMNS). One considers multisoliton solutions in order to get an enhancement of nuclear reactions. Moreover, an analogy of a catalysis breaks down. The screening of Coulomb interaction between deuterons and lowering a Coulomb barrier by multisoliton solutions of KP equations will be very important in metals filled with deuterons. We can still use a Gamow formula, moreover, now an analogy of biding deuterons together cannot be maintained. Moreover, it seems that one can consider more general configuration of ions surrounded by electron plasma governed by KP equations.[2]

A transmission coefficient (a transition probability) for a deuteron (a quantum tunneling) is (for E is approximately zero):[2]

$$\sigma_{d^+ d^+} = P(0) \approx \exp\left(-2\sqrt{2}\sqrt{\frac{M_D}{\hbar}} \iiint\limits_{V_0(t)} \sqrt{V(\vec{r},t)}d^3(\vec{r}) \right) \tag{5}$$

The integral is over a potential barrier (V0(t)) which depends on a time. In this way we get (even in multisoliton solutions for KdV or KP equations) something which is similar to catalysis. Multisoliton solutions (n-soliton solutions or even cn-like waves) can lower a Coulomb barrier between two deuterons resulting in higher rates of low energy nuclear reactions. These phenomena can be called a "soliton catalysis". [2]

We have not here any analogue to muon catalysis. This analogy breaks down as we mention above. There is no analogy also to heavy fermion catalysis or even to one-soliton catalysis. Moreover, we call this possible enhancement of nuclear reaction rates a soliton catalysis. This catalysis is similar to enzymatic catalysis in biochemistry. This seems to be a promising approach. Moreover, we should fill a sample of metal (maybe a metal foil) with a deuter. This could be done using low energy beams of deuterons. Simultaneously the metal involved here should be a hydrogen storage (a high affinity to hydrogen). We can of course try Al, C, Ta, Zr or metal oxides.

Concluding remarks

We have shortly reviewed possible coherent tunneling by Aharonov-Bohm electrodynamics and also possible soliton catalysis in low energy nuclear reaction. It is our hope that these two approaches may be found useful in the context of CMNS.

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A Review of Nonlinear Traveling Waves for the Skeleton of the Madden-Julian Oscillation and its Analogy with Toda Lattice

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ABSTRACT

The Madden-Julian Oscillation (MJO) is the dominant component of intraseasonal (30-90 days) variability in the tropical atmosphere. In this paper, we review traveling wave solutions for the MJO skeleton model of Majda and Stechmann. The model is a system of nonlinear PDEs that describe the evolution of the tropical atmosphere on planetary (10000-40000) spatial scales. It can be shown that such a system of PDEs reduces to become a system of ODEs, which then it can be transformed into a system of coupled ODEs which is quite analogous to Toda Lattice. Then we discuss how we can simulate Toda lattice with cellular automata. While these approaches may have been known for long time in other fields of physics, their roles in understanding atmospheric pattern have not been discussed quite often. It is our hope, that these new approaches will find their ways to experimental vindications.

Keywords: atmospheric flow, tropical atmosphere, Madden-Julian oscillation, nonlinear PDE, Toda lattice

Introduction: what is Madden-Julian oscillation?

There are many literatures which discuss Madden-Julian Oscillation. According to an article by Gottschalk [1]:

> "Imagine ENSO as a person riding a *stationary* exercise bike in the middle of a stage all day long. His unchanging location is associated with the persistent changes in tropical rainfall and winds that we have previously described as being linked to ENSO. Now imagine another bike rider entering the stage on the left and pedaling slowly across the stage, passing the stationary bike (ENSO), and exiting the stage at the right. This bike rider we will call the MJO and he/she may cross the stage from left to right several times during the show.
> So, unlike ENSO, which is stationary, the MJO is an *eastward moving* disturbance of clouds, rainfall, winds, and pressure that traverses the planet in the tropics and returns to its initial starting point in 30 to 60 days, on average. This atmospheric disturbance is distinct from ENSO, which once established, is associated with persistent features that last several seasons or longer over the Pacific Ocean basin. There can be multiple MJO

events within a season, and so the MJO is best described as *intraseasonal* tropical climate variability (i.e. varies on a week-to-week basis).

The MJO was first discovered in the early 1970s by Dr. Roland Madden and Dr. Paul Julian when they were studying tropical wind and pressure patterns. They often noticed regular oscillations in winds (as defined from departures from average) between Singapore and Canton Island in the west central equatorial Pacific (Madden and Julian, 1971; 1972; Zhang, 2005).

The MJO consists of two parts, or **phases**: one is the enhanced rainfall (or **convective**) phase and the other is the suppressed rainfall phase. Strong MJO activity often dissects the planet into halves: one half within the enhanced convective phase and the other half in the suppressed convective phase. These two phases produce opposite changes in clouds and rainfall and this entire **dipole** (i.e., having two main opposing centers of action) propagates eastward."

In other words, MJO is the dominant component of intraseasonal (30-90 days) variability in the tropical atmosphere. And fortunately, it is possible to model it using a system of nonlinear PDEs as we will discuss in the next section.[2][3]

Modelling MJO skeleton using nonlinear PDEs

Majda & Stechmann obtain the simplest dynamical model for the MJO skeleton by assuming that the modulated heating due to synoptic scale wave activity has the simple equatorial meridional structure proportional to $\exp(-y2/2)$. Such a meridional heating structure is known to excite only Kelvin waves and the first symmetric equatorial Rossby waves, and one can write the resulting meridionally truncated equations as follows, after modified slightly by Chen & Stechmann [2][4]:

$$
\begin{aligned}
&\mathrm{K}_t + \mathrm{K}_x = -\frac{1}{\sqrt{2}}(\overline{H}A - F), \\
&\mathrm{R}_t + \frac{1}{3}\mathrm{R}_x = -\frac{2\sqrt{2}}{3}(\overline{H}A - F), \\
&\mathrm{Q}_t + \frac{1}{\sqrt{2}}\overline{Q}\mathrm{K}_x - \frac{\overline{Q}}{6\sqrt{2}}R_x = \left(\frac{\overline{Q}}{6} - 1\right)(\overline{H}A - F), \\
&A_t = \Gamma a Q.
\end{aligned}
\tag{1}
$$

Chen & Stechmann [4] show that by assuming that the wave travels with speed s, the traveling wave ansatz converts the PDE system (1) to a set of ODEs, by writing [K,R,Q,A](x,t)= [K,R,Q,A](x'), where x'=x-st, so:

$$(-s+1)K' = -\frac{1}{2}(\overline{H}A - F),$$

$$(-s-\frac{1}{3})R' = -\frac{1}{3}(\overline{H}A - F),$$

$$-sQ + \overline{Q}K' - \frac{\overline{Q}}{3}R' = \left(\frac{\overline{Q}}{6} - 1\right)(\overline{H}A - F),$$

$$-sA' = \Gamma QA.$$

(2)

After some variables transform, the system (2) further simplifies the ODE system into:

$$Q' = f(s)(\overline{H}A - F),$$

$$A' = -\frac{\Gamma}{s}QA,$$

where

$$f(s) = \frac{3\tilde{Q}}{s-1} - \frac{2\tilde{Q}}{1+3s} - \tilde{Q} + 6.$$

(3)

The nonlinearity of equations (3) is reminiscent of the Toda lattice model. Therefore, in the next section we will discuss Toda lattice instead of using Toda oscillator [2]. The advantage of using Toda lattice approximation is that we can transform our system (3) into discrete integrable systems, such as cellular automata model. [5]

The two dimensional Toda lattice equation

By considering the 2-dimensional Toda lattice equation:[5]

$$\frac{\partial^2}{\partial_x \partial_t} Q = f(s)$$

where

$$f(s) = V_{n+1} - 2V_n + V_{n+1}.$$

(4)

The 2DTL equation is a differential-difference equation, since only one of the independent variable is discrete, while the other two are continuous. It can be shown that the discrete 2DTL equation exhibits resonance and web structure. [5] And it seems interesting to explore these in relation with MJO oscillation.

Concluding remarks

Summarizing, the MJO skeleton can be modelled as a system of PDEs which then reduce to a system of ODEs which is analogous to Toda Lattice system. The 2DTL equation is a differential-difference equation, since only one of the independent variable is discrete, while the other two are continuous. It can be shown

that the discrete 2DTL equation exhibits resonance and web structure. And it seems interesting to explore these in relation with MJO oscillation.

It is our hope that these new approaches can be found useful in studying atmospheric flow and MJO oscillation by computer simulations.

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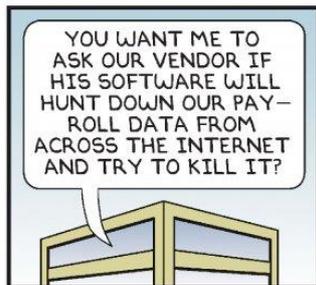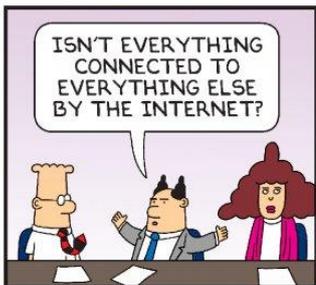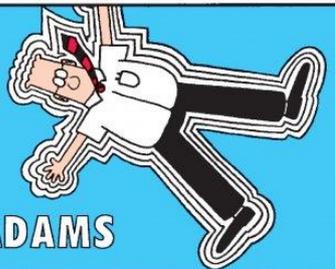
What we can do to save humanity in the coming era of global eavesdroppers

(or The social innovation way to solve collective action problem)

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Abstract — **In this paper, we tried to draw a fair assessment on things which will take place soon with the coming era of IoT, 5G technology, global eavesdropping and all that. Nonetheless, we are aware that this article sounds quite gloomy. We are not techno-utopians (read Evvgeny Morozov's WSJ article on digital dictatorship[6]), but we are not techno-pessimists either. Perhaps you can consider us as: "*techno-realists*."[7] This paper was written in the same spirit of Jonathan L. Zittrain's book *The Future of Internet and how to stop it.***

Keywords — wireless technology, network security, mobile internet security, global eavesdropping, digital dictatorship.

Introduction

One of the great economists of 20th century, John Maynard Keynes, once remarked: "*Everybody wants to go to heaven, but not too soon*." Surely, it depends much on how you define heaven. If you define heaven as fast internet access anywhere, possibility of tracking everything, and plenty choices of movie channels, then you can expect your dream will be fulfilled soon. Especially considering recent news of 5G technology already in place for several cities in China, and *Digit Act Bill* passed by US Senate since 2016, and smartphones getting cheaper and cheaper each month.(1) So you can get access on everything faster than ever. Some futurists even declare the coming of "abundance" era, accelerated by rapid advancement of technology. But now the hard questions: is that really a heaven for the entire global population? Or, are we running faster to nowhere? Let us consider some real examples on how bad things can happen along the way.

a few examples

1. The leak report by Edward Snowden revealed ongoing advanced eavesdropping by NSA on the entire population of US citizens. Although the details are rather complicated, including perhaps a very peculiar software called PRISM, soon it became clear that such a report is not just fake. Another report reveals argument by intelligence community that such an eavesdropping is necessary in order to anticipate terrorism attack. But Snowden criticized effectiveness of massive surveillance on US ordinary people for tracking potential threat; instead he argued that such a massive surveillance only distracts intelligence community from doing real work on tracking potential harmful terrorists. His prediction became

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[6]https://www.wsj.com/articles/SB10001424052748703983004575073911147404540

[7] http://www.technorealism.org/

confirmed at the time of attack in Boston, and also in other areas – when no surveillance method could anticipate.

2. After Snowden story was forgotten, there is a recent report on the stolen passwords of all Yahoo email users, during 2013-2014. The number is quite staggering, not just 100 million, not 200 million, but the whole 3 billion users. Of course, nobody from Yahoo officers would admit whether they were just sloppy with their system, or they allowed a sort of backdoor access on PRISM eavesdropping. Other email service providers remain muted on this topic too.(2)

3. There is also a growing number of research papers discussing potential global eavesdropping on various wireless communication systems, including each and every piece of handheld devices.(3)

4. And with *Digit Act Bill*, we can expect there will be plethora of new kind of surveillance cameras with built-in RF technology.

5. On top of that, Internet of Things will enable remote controlling of devices, such as wireless sensors etc. Of course, official ads that you watch on television and newspapers only tell you the best out of these things, such as monitoring your kids at home while you are working and so on. But as the Murphy Law tells us, "*all things which can possibly go wrong, will go wrong.*"(5) A number of dystopian movies like "Eagle Eye" depicts how bad things can go when you are being monitored 24 hours a day, and there is no such thing as privacy anymore. And sort of those things are already put in place or underway.

what is global eavesdropper

According to Alejandro Proano et al.: (6)

> *Wireless sensor networks (WSNs) have shown great potential in revolutionizing many applications including military surveillance, patient monitoring, agriculture and industrial monitoring, smart buildings, cities, and smart infrastructures. Several of these applications involve the communication of sensitive information that must be protected from unauthorized parties. As an example, consider a military surveillance WSN, deployed to detect physical intrusions in a restricted area. Such a WSN operates as an event-driven network, whereby detection of a physical event (e.g., enemy intrusion) triggers the transmission of a report to a sink.*
>
> *Although the WSN communications could be secured via standard cryptographic methods, the communication patterns alone leak contextual information, which refers to event-related parameters that are inferred without accessing the report contents. Event parameters of interest include: (a) the event location, (b) the occurrence time of the event, (c) the sink location, and (d) the path from the source to the sink. Leakage of contextual information poses a serious threat to the WSN mission and operation. In the military surveillance scenario, the adversary can link the events detected by the WSN to compromised assets. Moreover, he could correlate the sink location with the location of a command center, a team leader, or the gateway. Destroying the area around the sink could have far more detrimental impact than targeting any other area. Similar operational concerns arise in personal applications such as smart homes and body area networks. The WSN communication patterns could be linked to one's activities, whereabouts, medical conditions, and other private information.*

In the above contexts, contextual information can be exposed by *eavesdropping* on over-the-air transmissions and obtaining transmission attributes, such as inter-packet times, packet source and destination IDs, and number and sizes of transmitted packets. (6)

the big picture

In other words, with the coming of IoT, it would mean that we are in the dawn of global eavesdropping. So, what can we do to save our daily life as human being in this planet?

This situation looks really gloomy from each angle, but that will surely happen if we allow corporate-giants take control over each minute of our life – just like in Aldous Huxley's *The brave new world.*[8]

It reminds us to an old story:

> *"There was a guy who one night got into a nightmare, where he live in a country controlled by a terrible dictatorial governor in a province. Many people suffer under that governor. So, he asked himself: "What should I do now? Should I become a rebel, fighting for freedom? Or should I become a liberator, to avoid suffering of those people? Or should I work out my own way up to become a new governor, to replace that cruel bastard? Finally, he came up with a simpler solution: he woke up from his dream. That way he became conscious."*

Perhaps the lesson of the above story is quite similar with a wonderful Italian movie: *Life is beautiful.*[9]

The movie tells a story of an Italian Jewish bookseller called Guido, who just married with Dora. And they got a boy (Giosue). Their happiness was abruptly halted, however, when Guido and Giosue were separated from Dora and taken to a concentration camp. Determined to shelter his son from the horrors of his surroundings, Guido convinced Giosue that their time in the camp is merely a game. He told that in the end his boy will get a prize: a tank. At the end of the movie, Guido did not survive, but his wife and Giosue did. Then a US soldier put him up to a tank, just like what his father promised.

The lesson is that no matter how hard the situation will be, actually we determine our own state of mind. We can choose to be happy, or to be defeated in spirit. We can choose to be human or to be absorbed in the entire system of global eavesdropping. Therefore, let us now consider what our options are.

Here are a few options which you can consider:
1. There are extreme ways of living advocated by technophobia people (Luddism), like cutting off your internet wires, throwing your laptop out of the window, and go to a remote mountain or find the end of the rainbow. We certainly do not advocate that.

2. Going to an exoplanet, a few million light years away from here, is not an option either. Perhaps we should give a decade or more to visionary people like Elon Musk or Jeff Bezos to figure out how we can go there, if it is possible at all.

3. So, for the rest of us, what we can do is to use internet technologies wisely. Update regularly your antivirus software, and change your passwords each 2 months or sooner. And don't use too much free wi-fi in public places, because many people can track you. But if it is okay for you to be monitored by someone else. It is up to you.

4. If you belong to millennial generation, chance is you have become more adept with all these tips. But perhaps you want to do more for society. Our advice is, quoting a word of wisdom for environment activists in 90s: "*Think globally, act locally.*" That would mean you should better find a number of friends near you who think likewise, and try to do something good for your community, be it helping orphanage or something like that. We have heard that a number of CEOs only work 3-4 days a week, and they spend the rest of the week to do what they can do for their community.

5. If your small group gets larger and becomes a national movement, then things get interesting. Do not do lobbying to Senate like those big oil companies in order to advance their interests. Instead, you can try to solve Mancur Olson's problem: "*how your group can do collective action at large scale, while the benefits are not so tangible for everyone*" (4). Our hypothesis is: Olson's collective action problem only applies to unconnected society. In a heavily connected society like ours now, we can figure out how to solve this Olson's dilemma, and doing some meaningful collective actions in the internet.[10] For example: there are some initiatives of online crowdfunding, crowdsourcing, and online cooperatives.[11] So, actually you can start to do something good to your community even with a small amount of fund, provided you plan properly and do it collectively.

6. A few hints for IT folks
If you are IT folks, perhaps you can try to do some advanced tips as follows:

> *To mitigate global eavesdropping, Proano et al. proposed traffic normalization methods that regulate the sensor traffic patterns of a subset of sensors that form MCDSs. They developed two algorithms for partitioning the WSN to MCDSs and SS-MCDSs and evaluated their performance via simulations. Compared to prior methods capable of protecting against a*

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[8] http://www.idph.com.br/conteudos/ebooks/BraveNewWorld.pdf

[9] https://en.wikipedia.org/wiki/Life_Is_Beautiful

[10] An outline of reasoning to support this hypothesis can be found in Appendix, albeit it is not so sophisticated.

[11] For example: www.startsomegood.com

the Utilitarian question: Psychopathic traits inside our minds

By suggesting an option to do collective action, it does not mean we are not aware that each of us has selfish motive. In fact, some of us on top of the ladder of society have inclination to be a psychopath. Let us quote an interesting article by Lindsay Dodgson: (9)

In the Diagnostic and Statistical Manual of Mental Disorders, or DSM-5, antisocial or psychopathic personality types are defined as having an inflated, grandiose sense of themselves, and a habit of taking advantage of other people. However, it's still a hard disorder to define, as most of us have some psychopathic traits. In fact, some psychologists believe everyone falls on the psychopathy spectrum somewhere.

On their own, some traits are beneficial to us, such as keeping a cool head, and having charisma. This is why many psychopaths become CEOs, because they can look at the cold, hard facts and make decisions without becoming emotionally involved.

Still, a number of researchers have attempted to find a way of diagnosing psychopathic behavior. One well-known test for psychopaths is the "*The Hare Psychopathy Checklist*," which analyses how you see yourself and other people.

The team from Columbia Business School and Cornell Universities gave participants a set of moral dilemmas, and also asked them to complete three personality tests: one for assessing psychopathic traits, one assessing Machiavellian traits, and one assessing whether they believed life was meaningful.

This was one of the questions they were asked:

"A runaway trolley is about to run over and kill five people and you are standing on a footbridge next to a large stranger; your body is too light to stop the train, but if you push the stranger onto the tracks, killing him, you will save the five people. Would you push the man?"

The team found that those who answered the dilemmas with an "ethic of utilitarianism" — the view which says the morally right action is whichever one produces the best consequence overall — possessed more psychopathic and Machiavellian personality traits. In the above question, if you'd choose to push the man, you have more in common with the people who had psychopathic or Machiavellian traits.

This makes sense when you think about how Machiavelli generally believed *"the ends justifies the means*," and that killing innocent people could be normal and effective in politics, as long as the outcome was for the greater good.(9)

This article seems convince us that we need to become aware on our own tendency of being a psychopath. Moreover, it takes honesty to admit that we are prone to be selfish person…then we can work out to be a better person. But there is a deeper question: if controlling our own motive can be very difficult, then where is our society heading? What are our choices?

where we are heading from here

Now, some of you may ask: by suggesting solution to Olson's collective action problem to save our humanity, where is the article heading? Are we advocating collective society as in old day Marxism hammer? Or are we advocating how to escape from the curse of capitalism's social darwinism?[12]

Yes, normally you read numerous political-economics jargons, e.g. leftist, right wing, centrist left or centrist right and so on.

But it is not our intention to submit another ideological parlance. In fact, these authors are scientist and mathematician, so we are not so inclined to any parlance.

In our opinion, our tendency to cooperate or compete is partly influenced by the culture that we inherit from our ancestors. One of us (VC) once lived for a while in Russia, and he found that many people there are rather cold and distant (of course not all of them,

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[12] See for example Richard Hofstadter: Social Darwinism in American thought. url: http://culturism.us/booksummaries/SocialDarwinismHofst.pdf

some are friendly). He learned that such a trait is quite common in many countries in Europe. They tend to be individual and keep a distant to each other. In physics term, they are like *fermions*.[13]

There is a developmental psychology hypothesis that suggests that perhaps such a trait correlates to the fact that many children in Europe lack nurtures and human touch from their parents, which make them rather cold and individual. Of course, whether this is true correlation, it should be verified.

On the contrary, most people in Asia are gregariously groupie (except perhaps in some big metropolitans). They tend to spend much time with family and friends, just like many Italians. They attend religious rituals regularly, and so on. In physics term, they are *bosons*. Of course, this sweeping generalization may be oversimplifying.[14]

Therefore, it seems quite natural to us, why Adam Smith wrote a philosophy book suggesting that individual achievement is a key to national welfare (because he was a British which emphasized individualism).[15] It took more than hundred years until mathematicians like John F. Nash, Jr. figured it out that individual pursuit towards their own goals will not lead them to achieve a common goal as society.[16]

That is why, we choose to work out Mancur Olson's theorem, because he is able to condense the complicated game theoretical reasoning (whether one should cooperate or not) into a matter of collective actions.

So, which is better: *to be like fermions or bosons?* Our opinion is: just like in particle physics, both fermions and bosons are required. In the same way, fermion behavior and boson behavior are both needed to advance the quality of life. Fermion people tend to strive toward human progress, while boson people are those who make us alive. Just like an old song: Ebony and Ivory….they make harmony in society.

We hope this paper help us to see that collective actions are what made us a human society.[17] And it seems related to *social innovations* and also social *capital* too, in other words a society with social capital and collective actions will ensure its sustainable future.[18] But this is beyond the scope of this article, let us leave such a discussion to economists.

But this article surely does not offer a bold answer to where we are heading as global community. Do we arrive at the end of history or this is just a beginning to a new era? Let time will tell.

concluding remarks

In this paper, we tried to draw a fair assessment on things which will take place soon with IoT, 5G and all that. Nonetheless, we are aware that this article sounds quite gloomy. We are not techno-utopians (read Evgeny Morozov's WSJ article on digital dictatorship[19]), but we are not techno-pessimists either. Perhaps you can consider us as: "*techno-realists.*"[20] This paper was written in the same spirit of Jonathan L. Zittrain book's *The Future of Internet and how to stop it.*

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[13] While our proposed simplifying analogy of human behaviour, i.e. individualism and collectivism sound not so common. Indeed such cultural psychology research has been reported since Harry C. Triandis et al. See for example: (a) The Self and Social Behavior in Differing Cultural Contexts, Psychological Review, vol. 96 no. 3; (b) Harry C. Triandis and Eunkook M. Suh, CULTURAL INFLUENCES ON PERSONALITY, Annu. Rev. Psychol. 2002. 53:133–60; (c) J. Allik & A. Realo, Individualism-collectivism and social capital, JOURNAL OF CROSS-CULTURAL PSYCHOLOGY, Vol. 35 No. 1, January 2004, 29-49. This last mentioned paper includes a quote from Emile Durkheim: "The question that has been the starting point for our study has been that of the connection between the individual personality and social solidarity. How does it come about that the individual, whilst becoming more autonomous, depends ever more closely upon society? How can he become at the same time more of an individual and yet more linked to society?"

[14] After writing up this article, we found that Sergey Rashkovskiy also wrote a quite similar theme, albeit with a statistical mechanics in mind. The title of his recent paper is: "'Bosons' and 'fermions' in social and economic systems." Here is abstract from his paper: "We analyze social and economic systems with a hierarchical structure and show that for such systems, it is possible to construct thermostatistics, based on the intermediate Gentile statistics. We show that in social and economic hierarchical systems there are elements that obey the Fermi-Dirac statistics and can be called fermions, as well as elements that are approximately subject to Bose-Einstein statistics and can be called bosons. We derive the first and second laws of thermodynamics for the considered economic system and show that such concepts as temperature, pressure and financial potential (which is an analogue of the chemical potential in thermodynamics) that characterize the state of the economic system as a whole, can be introduced for economic systems." Url: https://arxiv.org/ftp/arxiv/papers/1805/1805.05327.pdf

[15] If only Adam Smith was born in Bangkok or Manila, probably he wrote his book in a different way.

[16] Imagine 10 players of a football team go simultaneously to make a goal to their opposite team, will they succeed? Of course no, they should arrange according to their coach's instruction: 1-4-4-2, or other type of arrangement.

[17] In our country, there is a specific word for some people who work together to achieve a common goal: "*gotong royong.*"

[18] Emily Ouma & Awudu Abdulai. Contributions of Social Capital Theory in Predicting Collective Action Behavior among Livestock Keeping Communities in Kenya. url: https://ageconsearch.umn.edu/bitstream/49994/2/Manuscript%20No.%20423_Social%20capital%20theory%20and%20collective%20action.pdf

[19] https://www.wsj.com/articles/SB10001424052748703983004575073911147404540

[20] http://www.technorealism.org/

Allow us to conclude this message with a short message: "*With the coming era of global eavesdroppers, it is not the end of history (Fukuyama). But it will be the end of humanity as we know it, unless we do something collectively to prevent it to happen.*" Thank you.

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"Olson develops a theory of group and organizational behavior that cuts across disciplinary lines and illustrates the theory with empirical and historical studies of particular organizations, examining the extent to which individuals who share a common interest find it in their individual interest to bear the costs of the organizational effort."

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Appendix: Superconductive Olson theorem

Mancur Olson's problem: "how a large group can do collective action, while the benefits are not so tangible for everyone."

How to solve it...

Superconductive Olson theorem:
"*Olson's collective action problem only applies to unconnected society, but not in a digitally connected society.*"

Outline of reasoning:

Olson's problem in principle states that in a large group, it becomes difficult to do a meaningful collective action, especially if the benefits for participants are small. That is because individuals mostly seek only their own self-interests.

Let us analyze what actually happens when a group of people is trying to do a collective action. Let us say a group of 10 volunteers want to build mini waste treatment plant for their town. Then they need to gather to discuss the design, the required cost, operational

cost etc. It becomes easier to accomplish the plan provided they live in the same city, so their transportation costs are minimal. In that case, the voluntary group members do not expect much in return, except to do something good for the town.

But let us consider a larger group of volunteers in a national scale, this time they want to gather twice a month in a capital city. So, each member of the group needs to spend cost to go to the capital city. Of course they would expect certain benefits in return in order to pay off the costs they have to spend, otherwise the voluntary plan will not become realized. In both above cases, Olson's analysis is correct. But Olson wrote his Princeton dissertation around 60s. At the time there was no internet connection except perhaps for military purposes.

In our opinion, his theory of collective action is mostly correct, except that he neglects the role of pervasive digital network (internet).

Nowadays, a large group of people can work collectively for a cause with almost zero cost. Therefore, actually there is no barrier anymore to gather a large group to do certain collective actions for the community. For example, gathering polls or doing a petition, e.g, www.petition.com.

Concluding remarks

Our own experience over the past few years also convince us that Olson's collective action problem does not apply in the internet era. It is more like superconductivity phase of material, where electrons can move without resistance. We tend to name our extension of Olson's theorem as "*Superconductive Olson theorem*." Only time will tell what is its role in the future of Internet.

The World Within Us:

(or : A sketch of consciousness space beyond Freudian mental model and implications to socio-economics modeling and integrative cancer therapy)

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Abstract

In this paper, we give an outline of an ongoing study to go beyond Freudian mental archetypal model. First, we discuss the essence of numerous problems that we suffer in our sophisticated and modernized society. Then we discuss possibility to reintroduce spirit into human consciousness. While we are aware that much remain to be done and we admit that this is only a sketch, we hope that this paper will start a fresh approach of research towards more realistic nonlinear consciousness model with wide ranging implications to socio-economics modeling and also integrative cancer therapy. At the last section we also shortly outline plausible method to vindicate our proposed *boson-fermion model* of human society in a physical experiment.

Introduction

One of us (FS) recently published a new book, with title: Neutropsychic personality.[1] In this book, FS described possible extension of Freudian mental model: id-ego-superego, using his Neutrosophic Logic theory. He goes on to develop implications of this approach.

Later on, we thought that it would be necessary to push the boundary one step further, by considering a more realistic way to go beyond that classic Freudian mental model, i.e. by reintroducing the spirit into human consciousness model. We are aware that many researchers have proposed such an extension, especially Italian tradition which was continually developed by students of Carl

Jung, such as Assagioli and Piere Ferrucci, namely the *Psychosynthesis* movement. See for example [3].

But here we offer a different starting point of mental model, based on Matthew 22, i.e. *The Great Commandments*. As far as we know, i.e. this is the simplest model of human consciousness, yet it is profoundly inspired by the Bible. This author adopts a rather relaxed approach to present his ideas, with the hope to stimulate both sides of your brain, in order you can realize on how we as human society badly need thoroughly review the present healthcare especially to socio-psychiatry and also to cancer therapy.

A short review of Neutropsychic

One of us (FS) recently published a new book, with title: Neutropsychic personality.[1] In this book, FS described possible extension of Freudian mental model: *id-ego-superego*, using his Neutrosophic Logic theory. His definition of Neutropsychic is as follows:

> "Neutropsyche is the psychological theory that studies the soul or spirit using the neutrosophy and neutrosohic theories. It is based on triadic neutrosophic psychological concepts, procedures, ideas, and theories of the form (<A>, <neutA>, <antiA>), such as (positive, neutral, negative), (good behavior, ignorant behavior, bad behavior), (taking the decision to act, pending, taking the decision not to act), (sensitive, moderate, insensitive), (under-reacting, normally reacting, over-reacting), (under-thinking, normal thinking, over-thinking), and so on, and their refinements as (<Aj>, <neutAj>, <antiAj>)." [1, p.29]

Among other things, he refines the notion of human memory:

> "*Neutrosophic Memory*:
> Memory is thus divided into three main parts. It is a symmetric triad of the form (<A>, <neutA>, <antiA>) as in neutrosophy: 1) Conscious, meaning things that we are currently aware of. (It corresponds to <A>.) 2) Unconscious, which comprises things that we are not aware of; they are hard to access because they are deep inside our mind. It is the opposite of conscious. (It corresponds to <antiA>.)
> According to Webster Dictionary, unconscious means: "not endowed with consciousness; mindless; [...] (Psychoanalysis) the sum of all thoughts, memories, impulses, desires, feelings, etc. of which the individual is not conscious but which influence the emotions and behavior; that part of one's psyche which comprises repressed material of this nature" (p. 1453). We first cite a Webster definition since it is more objective by comparison with subjective definitions given by biased theorists. Freud [15, 16] has considered the unconscious as a repository for unacceptable desires and ideas by the society, and traumatic memories. 3) Aconscious. We coin now for the first time the concept of "aconscious" (adj.), the "aconscious" (noun), and the derivatives

"aconsciousness" (noun) and "aconsciously" (adv.), which etymologically means away from conscious and unconscious, or neither conscious nor unconscious, but in between, or a mixture of conscious and unconscious – a vague buffer zone between them.

Doing a search on American search engine Google (google.com), European search engine Bing (bing.com), and Chinese search engine (baidu.com) for the word "aconscious" on February 15th, 2018, we got no entry. Also, the concept "aconscious" does not exist in English, Latin, Greek languages – using Google's translation dictionaries. The consciousness, aconsciousness, and unconsciousness are the sources of positive, neutral (or blended), and negative emotions, thoughts, and behaviors throughout our lifespan." [1, p. 37-39]

But here we will not discuss on such a conceptual extension of human memory, instead we will discuss a new conceptual model of human consciousness beyond Freudian mental mode. First of all, let us discuss a basic problem with this modern society.

Problem with this modern society

Our modernized and highly sophisticated society bring numerous advantages over our ancestors, but it is not without consequences. To summarize, we are running anywhere but we find less and less happiness, as it has been pointed long time ago by Albert Einstein.

As per records in Caltech, he once spoke:[1]

"Why does this magnificent applied science, which saves work and makes life easier, bring us so *little happiness*? The simple answer is because we have not yet learned to make sensible use of it. In war, it serves that we may poison and mutilate each other. In peace, it has made our lives hurried and uncertain instead of freeing us in great measure from spiritually exhausting labor. It has made men into the slaves of machinery, who for the most part complete their monotonous long days' work with disgust, and must continually tremble for their poor rations. You will be thinking that the old man sings an ugly song. I do it, however, with a good purpose, in order to point out a consequence. It is

not enough that you should understand about applied science in order that you may increase man's blessings.

Concern for man himself and his fate always forms the chief interest of all technical endeavors. Concern for the great unsolved problems of the organization of labor, for the distribution of goods, *in order that the creations of our minds shall be a blessing and not a curse. Never forget this in the midst of your diagrams and equations.*" (italic emphasizes by these authors)

Although that speech was translated from German, but the essence remain relevant even for our today's life as scientists, as Harry Gray once remarked:

"That was Albert Einstein on February 16, 1931, to the Caltech student body, translated by somebody and slightly retranslated by me. -- Obviously, what he said over 40 years ago has relevance to our situation today."[1]

Moreover, we are constantly under pressure in every direction of our life. Perhaps the best sociologist and observer of this heavy burden of life is *Queen*, a British supergroup from 70-90s era:

Under Pressure
Queen, David Bowie

Mm ba ba de
Um bum ba de
Um bu bu bum da de
Pressure pushing down on me
Pressing down on you no man ask for
Under pressure that brings a building down
Splits a family in two
Puts people on streets
Um ba ba be
Um ba ba be
De day da
Ee day da - that's okay
It's the terror of knowing
What the world is about
Watching some good friends
Screaming 'Let me out'

Pray tomorrow gets me higher
Pressure on people people on streets
Day day de mm hm
Da da da ba ba
Okay
Chippin' around - kick my brains around the floor
These are the days it never rains but it pours
Ee do ba be
Ee da ba ba ba
Um bo bo
Be lap
People on streets - ee da de da de
People on streets - ee da de da de da de da
It's the terror of knowing
What this world is about
Watching some good friends
Screaming 'Let me out'
Pray tomorrow - gets me higher higher high
Pressure on people people on streets
Turned away from it all like a blind man
Sat on a fence but it don't work
Keep coming up with love but it's so slashed and torn
Why - why - why?
Love love love love love
Insanity laughs under pressure we're breaking
Can't we give ourselves one more chance
Why can't we give love that one more chance
Why can't we give love give love give love give love
Give love give love give love give love give love
'Cause love's such an old fashioned word
And love dares you to care for
The people on the (People on streets) edge of the night
And loves (People on streets) dares you to change our way of
Caring about ourselves
This is our last dance
This is our last dance
This is ourselves
Under pressure
Under pressure
Pressure

Now the question is: how can we find out the root cause of this problem of modern society?

Allow us to recall what Adam Grant emphasizes: the basic human motives are selfishness and altruism.

Figure 1. Adam Grant's model of human basic traits

And also we can recall from Genesis 3 that the first fall of our ancestors came from greediness. Now, do you realize: "*How far we have fallen in this modern society, where greed has been hailed as highest virtue?*"

Quoting Grekko's remark: *Greed is good.*

> "The point is, ladies and gentleman, that **greed**, for lack of a better word, is **good**. **Greed** is right, **greed** works. **Greed** clarifies, cuts through, and captures the essence of the evolutionary spirit. **Greed**, in all of its forms; **greed** for life, for money, for love, knowledge has marked the upward surge of mankind."[21]

We consider this is the true core of our modern reality, all of us have been consumed and drowning in the ocean of greediness. The real irony is that greediness has eaten us alive, from our childhood until we die. Even if we once die, there are those greed developers who sell a piece of cemetery with high price. They capitalize our bodies, our eyes, our jealousy, our heart, our mind, our consciousness. Literally speaking, we are more or less as *walking zombies.*

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[21] The Wall Street (1987). url: https://businessethicsblog.com/2010/10/12/wall-street-1987-greed-is-good/

We are getting improved at the outside, but we are no more than *rotten tomatoes* deep inside.

At this point, some may ask: How can we repair such a deep problem of our modern society?

Outline of reasoning: Toward Pneumatological view of psychology

We all know that Hebrew's thought on human being is integral, i.e. the whole of body-mind-spirit. But how can we come up with a model of human consciousness based on the Bible?

As a starting point, we choose to begin with Jesus's sayings, instead of using other trivial sources.

Let us begin by the Greatest Commandment

> Matthew 22:37-40 King James Version (KJV)
>
> *37 Jesus said unto him, Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind.*
>
> *38 This is the first and great commandment.*
>
> *39 And the second is like unto it, Thou shalt love thy neighbour as thyself.*
>
> *40 On these two commandments hang all the law and the prophets.*

Our re-reading of the above commandments lead us to model a Trinitarian dialogue within human self: God, self, and others.[22]

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[22] For an alternative reading of Mat. 22, see Vern Poythress's article: https://frame-poythress.org/the-greatest-commandment-the-very-heart-of-the-matter/
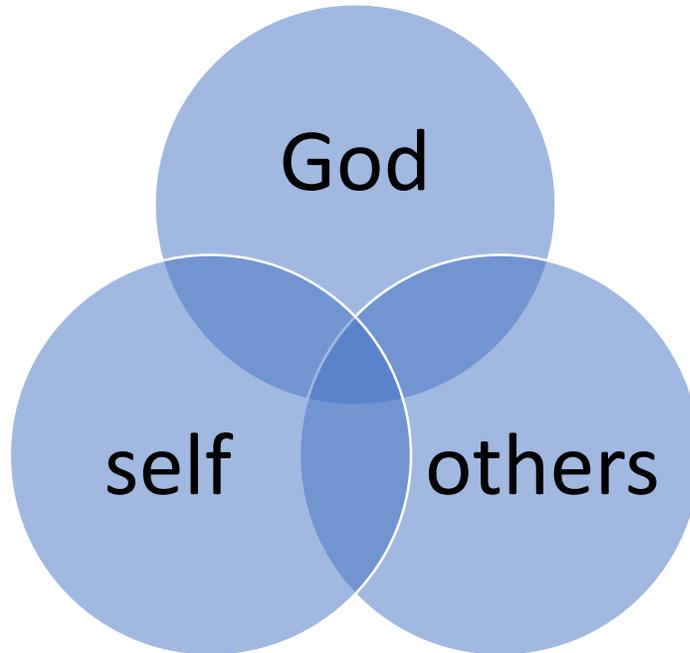
Figure 2. Three directions of human love based on The Greatest
Commandments in Matthew 22:37-40.

Comparing with Adam Grant's give and take model of human basic tensions
inside our mind. Let us consider parallels, i.e. "*taking*" reflects
selfishness/greediness motive of ego, and "*giving*" reflects altruism motive of
conscience.

In other word, now we have two entities in human consciousness: ego and
conscience. There is always deep tension between ego and consciousness,
between selfishness and altruism. Along these two poles, we need a third entity
which has purpose to ease and being intermediary between these two motives.
In this problem, along with *Neutrosophic Logic*, allow us to submit
wholeheartedly that the third entity, is actually no other than "the spirit."
(*pneuma* in Greek, *ruach* in Hebrew)
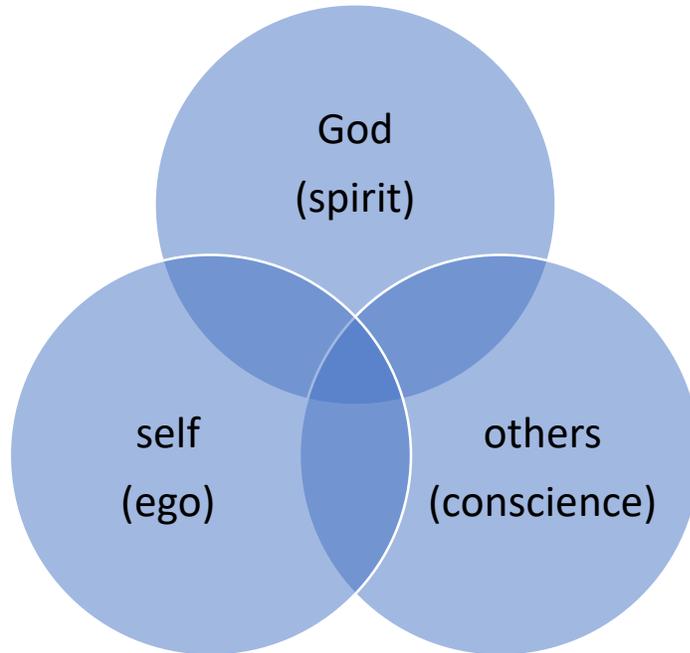
Figure 3. A model of human consciousness based on The Greatest Commandments in Matthew 22:37-40.[23]

The exact role of human spirit is to enlighten both ego and conscience. While some may raise question of what is new here? It seems similar with id-ego-superego model.

No, it is really in contrast with Freud's model which is purely materialistic in origin. The notion of spirit is rejected in freud model, that is why mankind reduces to animals in his model, determined by his/her sexual instinct. And there is no way out of such animal instinct in his model.

Sometimes it is called transpersonal psychology:

> "***Transpersonal psychology*** *is a sub-field or "school" of* ***psychology*** *that integrates the* ***spiritual*** *and transcendent aspects of the human experience with the framework of modern* ***psychology***. *It is also possible to* ***define*** *it as a "****spiritual psychology****".*

An interesting argument spiritual psychology has been discussed in Santa Monica site:

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[23] This model may be compared to Jung's personality model, which includes individual unconscious and collective unconscious. (see Prof. Thee Houw Liong's added note in preface.)

"If you look up the word "psyche" in the dictionary, you will find "breath, principle of life, Soul." But if you look up "psychology," you will find "the science of mind and behavior." Somehow, in the translation from essence to practice, the most important aspect of "psyche" has been lost. At the University of Santa Monica, we recognize our task as reintegrating the spiritual dimension back into the essence of an authentic psychological inquiry. It is this reintegration that evokes the emergence of a Spiritual Psychology.

Spiritual Psychology is the study and practice of the art and science of Conscious Awakening. To engage in this genre, we must begin by distinguishing the essence of human evolution—what does it mean to evolve? In short, it means learning how to identify, recognize, and navigate successfully within the Context of Spiritual Reality. Practically, it means learning how to surrender—or let go of—anything that disturbs one's peace. It also means sacrificing our illusions of separation. Essentially, this "surrendering" and "sacrificing" is work that can and has been called "healing," which includes healing on the physical, mental, and emotional levels in service to the deeper revelation of who we truly are as Loving, Peaceful, Compassionate, and Joyful beings. We refer to this level of awareness as the Authentic Self."

Of course, there are various approaches of spiritual psychology. But, what is really different in our simpler model?

Two possible implications: a) in socio-economics model

In this time we would only discuss the economics implications, based on modelling human identities into two opposites: (a) individualism (we call them: fermions), and (b) collectivism (we call them: bosons).

In a recent paper, we discuss how to solve Mancur Olson's collective action problem [2].

Now, some of you may ask: by suggesting solution to Olson's collective action problem to save our humanity, where is the article heading? Are we advocating collective society as in old day Marxism hammer? Or are we advocating how to escape from the curse of capitalism's social darwinism?[24]

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[24] See for example Richard Hofstadter: Social Darwinism in American thought. url: http://culturism.us/booksummaries/SocialDarwinismHofst.pdf

Yes, normally you read numerous political-economics jargons, e.g. leftist, right wing, centrist left or centrist right and so on.

But it is not our intention to submit another ideological parlance. In fact, these authors are scientist and mathematician, so we are not so inclined to any parlance.

In our opinion, our tendency to cooperate or compete is partly influenced by the culture that we inherit from our ancestors. One of us (VC) once lived for a while in Russia, and he found that many people there are rather cold and distant (of course not all of them, some are friendly). He learned that such a trait is quite common in many countries in Europe. They tend to be individual and keep a distant to each other. In physics term, they are like *fermions*.[25] There is a developmental psychology hypothesis that suggests that perhaps such a trait correlates to the fact that many children in Europe lack nurtures and human touch from their parents, which make them rather cold and individual. Of course, whether this is true correlation, it should be verified. On the contrary, most people in Asia are gregariously groupie (except perhaps in big metropolitans). They tend to spend much time with family and friends, just like many Italians. They attend religious rituals regularly, and so on. In physics term, they are *bosons*. Of course, this sweeping generalization may be oversimplifying.[26]

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[25] While our proposed simplifying analogy of human behaviour, i.e. individualism and collectivism sound not so common. Indeed such cultural psychology research has been reported since Harry C. Triandis et al. See for example: (a) The Self and Social Behavior in Differing Cultural Contexts, Psychological Review, vol. 96 no. 3; (b) Harry C. Triandis and Eunkook M. Suh, CULTURAL INFLUENCES ON PERSONALITY, Annu. Rev. Psychol. 2002. 53:133–60; (c) J. Allik & A. Realo, Individualism-collectivism and social capital, JOURNAL OF CROSS-CULTURAL PSYCHOLOGY, Vol. 35 No. 1, January 2004, 29-49. This last mentioned paper includes a quote from Emile Durkheim: "The question that has been the starting point for our study has been that of the connection between the individual personality and social solidarity. How does it come about that the individual, whilst becoming more autonomous, depends ever more closely upon society? How can he become at the same time more of an individual and yet more linked to society?"

[26] After writing up this article, we found that Sergey Rashkovskiy also wrote a quite similar theme, albeit with a statistical mechanics in mind. The title of his recent paper is: "'Bosons' and 'fermions' in social and economic systems." Here is abstract from his paper: "We analyze social and economic systems with a hierarchical structure and show that for such systems, it is possible to construct thermostatistics, based on the intermediate Gentile statistics. We show that in social and economic hierarchical systems there are elements that obey the Fermi-Dirac statistics and can be called fermions, as well as elements that are approximately subject to Bose-Einstein statistics and can be called bosons. We derive the first and second laws of thermodynamics for the considered economic system and show that such concepts as temperature, pressure and financial potential (which is an analogue of the chemical potential in thermodynamics) that characterize the state of the economic system as a whole, can be introduced for economic systems." Url: https://arxiv.org/ftp/arxiv/papers/1805/1805.05327.pdf

Therefore, it seems quite natural to us, why Adam Smith wrote a philosophy book suggesting that individual achievement is a key to national welfare (because he was a British which emphasized individualism).[27] It took more than hundred years until mathematicians like John F. Nash, Jr. figured it out that individual pursuit toward their own goals will not lead them to achieve a common goal as society.[28]

That is why, we choose to work out Mancur Olson's theorem, because he is able to condense the complicated game theoretical reasoning (whether one should cooperate or not) into a matter of collective actions.

So, which is better: *to be like fermions or bosons*? Our opinion is: just like in particle physics, both fermions and bosons are required. In the same way, fermion behavior and boson behavior are both needed to advance the quality of life. Fermion people tend to strive toward human progress, while boson people are those who make us alive. Just like an old song: *Ebony and Ivory*....they make harmony in society.[29]

We hope this paper helps us to see that collective actions are what made us a human society.[30] And it seems related to *social innovations* and also social *capital* too, in other words a society with social capital and collective actions will ensure its sustainable future.[31] But this is beyond the scope of this article, let us leave such a discussion to economists.

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[27] If only Adam Smith was born in Bangkok or Manila, probably he wrote his book in a different way.

[28] Imagine 10 players of a football team go simultaneously to make a goal to their opposite team, will they succeed? Of course no, they should arrange according to their coach's instruction: 1-4-4-2, or other type of arrangement.

[29] While we are fully aware that politically speaking, Marxism and capitalism are irreconcilable, recent studies indicate that there are possible intermediate states between these two, such as The Third way in Tony Blair's era, welfare states in most European countries, various cooperative systems in Scandinavian countries, state-driven capitalism in Vietnam and China, Japan inc. etc. In other words, from Neutrosophic perspective, dialogues between human tensions of individualism and collectivism remain open for future economics theorizing toward a much better and improved quality of life, while at the same time we ought to remove the dialectical clashes a la Huntington's NWO.

[30] In our country, there is a specific phrase for some people who work together to achieve a common goal: "*gotong royong.*"

[31] Emily Ouma & Awudu Abdulai. Contributions of Social Capital Theory in Predicting Collective Action Behavior among Livestock Keeping Communities in Kenya. url: https://ageconsearch.umn.edu/bitstream/49994/2/Manuscript%20No.%20423_Social%20capital%20theory%20and%20collective%20action.pdf

So, by introducing this analogy from particle physics theories, we hope to resolve the classic clash between socialism and capitalism, which are no other than a cruel reformulation of the above basic human motives into political struggles, in attempt to put the entire mankind into eternal slavery.

Too many decades have been wasted by numerous countries to fight on these ideologies, but the truth is these opposite ideological poles were crafted in order to trap mankind into eternal struggles.[32]

It needs to be stopped right now.

In Appendix I of this paper, the author gives a reflection on how we should slow down our pace, to become in tune with the speed of love, i.e. the speed of Jesus Christ: 3 mile-an-hour (cf. Kosuke Koyama).

Two possible implications: b) integrative cancer therapy

In this time we would only give a rough sketch of our ideas in cancer therapy, based on the aforementioned: *Pneumatological approach to psychology.*

In the light of the fact that proper discussion of theology of medicine is quite rare, this section highlights the fundamental problem with modern (Western) medicine. China has taken a step forward by recognizing their cultural heritage called TCM. Of course it must be acknowledged that modern (Western) medicine has been very advanced, but also many problems such as side effects and also many toxic materials due to synthetic materials. It is also well known that chemotherapy has a chance to work at a miserable rate of less than 20%, so it is reasonable to argue that the 21st century requires a conceptual, new approach to treatment.

A few months ago, a respected senior professor of physics in Indonesia, Prof. Dr. Bambang Hidayat, a member of the Indonesian Academy of Sciences, sent an article to a group of academics. In essence he asked: how our response

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[32] Some authors wrote that such crafted political struggles only gave monetary advantages to those greedy financial institutions, by selling weapons to both sides of parties. See for instance a very good movie*: The International.*

should be to China's recent policies that want to facilitate the practice of treatment based on TCM (traditional Chinese Medicine) in a balanced way. His concern is certainly understandable, given the current perception of society is that traditional medicine, often referred to as alternative medicine, is usually associated with shamanic practices or strange methods such as turtles, snakes, bruises etc., many of which have not passed any clinical trials.

But there are two important things that we should take note of Xi Jinping's new policy on TCM:

a. This policy starts from realizing that the cost of Western medicine is very expensive, mainly due to clinical trials of humans, so it is quite reasonable that the Chinese government wants to give more balanced attention to the Chinese medicine tradition.

b. Traditional Chinese medicine has grown for no less than 4000 years. However, we shall also note that there are some reports that in Asia, liver cancer can be linked to the use of (excessive) herbal medicines. Of course this needs further study. (5)

Regarding some people's concerns about the removal of clinical trials, it seems the Chinese government is quite cautious, see the following quote:

> "*Lixing Lao, director of Hong Kong University's School of Chinese Medicine, says that although traditional medicines will no longer need to go through clinical trials, the CFDA will still require remedies to undergo preclinical pharmacological testing and drug-toxicity studies in animals or cells to gain approval.*"(2)

Certainly it can be expected that the new policy will further strengthen the interest of people to develop and produce drugs based on herbs that have been known to be useful for thousands of years, rather than synthetic (artificial) substances that could potentially not be processed and become toxic.) (4)

In Indonesia, it is also known a variety of medicinal plants, and there are several apps that provide catalog of such live pharmacies. One of which can be called for example is gendola, which reportedly efficacious for diabetes, cancer, stroke, coronary heart, liver etc. Of course clinical trials are required for this gendola. (6)

The fundamental problem of modern medicine (Western)

There are several scientific authors who express vividly how fundamental the problem with modern (Western) medicine. The fundamental problem is commonly expressed with a *mechanistic* worldview as well as a Cartesian dualism philosophy. [8][19].

Sheldrake has revealed that the mechanistic view is actually derived from Neo-Platonic philosophy, so it is not based on biblical teaching.

A similar argument was developed by Fritjof Capra in his famous book, *The Turning Point.*[15] In rather similar tone, Christian philosopher *Alvin Plantinga* has written a paper criticizing materialism. [19]

Unfortunately, however, the thinking of scientists from such disciplines often fails in the midst of massive dis-information (and advertising) that modern (Western) medicine has managed to address almost all human health problems. Is that true?

Let's take a look at the colonial post-reading of Gen. 2: 7 and some other texts.

The post-colonial reading of Gen. 2: 7

If we glance at Gen. 2: 7, we see at a glance that man is made up of the dust of the ground (*adamah*) which is breathed by the breath of life by God (*nephesh*). Here we can ask, does this text really support the Cartesian dualism view? We do not think so, because the Hebrew concept of man and life is integral. The bottom line: it is not the spirit trapped in the body (Platonic), but the body is flowing in the ocean of spirit. [16] This means that we must think of as an open possibility for developing an integral treatment approach (Ken Wilber), or perhaps more properly called "**spirit-filled medicine**."

Let's look at three more texts:

a. Gen. 1: 2, "The earth is without form and void, darkness over the deep, and the Spirit of God hovering over the waters." Patterns such as Adam's creation can also be encountered in the creation story of the universe. Earth and the oceans already exist (similar to adamah), but still empty and formless. Then

the Spirit of God hovered over it, in the original text "*ruach*" can be interpreted as a strong wind (storm). So we can imagine there is wind/hurricane, then in the storm that God said, and there was the creation of the universe. From a scientific point of view, it is well known in aerodynamics that turbulence can cause sound (turbulence-generated sound). And primordial sound waves are indeed observed by astronomers.

b. Ps. 107: 25, "He said, he raised up a storm that lifted up his waves." The relation between the word (sound) and the storm (turbulence) is interactive. Which one can cause other. That is, God can speak and then storms, or the Spirit of God causes a storm. Then came the voice.

c. Ezekiel. 37: 7, "Then I prophesy as I am commanded, and as soon as I prophesy, it sounds, indeed, a crackling sound, and the bones meet with one another." In Ezekiel it appears that the story of the creation of Adam is repeated, that the Spirit of God is blowing (storm), then the sound of the dead bones arises.

The conclusion of the three verses above seems to be that man is made up of adamah which is animated by the breath or Spirit of God. He is not matter, more accurately referred to as spirit in matter. Like a popular song around 80s goes: "*We are spirits in the material world*." See also Amos Yong [14]. Therefore, it is inappropriate to develop only materialistic or Cartesian dualism treatment. We can develop a more integral new approach. [8]

The integral view of humanity and spirituality, instead of two-tiered Western view of the world, appears to be more in line with majority of people in underdeveloping countries, especially in Asia and Africa. See for instance the work by Paul Hiebert [21].

Among the studies supporting such an integral approach is the view that cells are waves, see the paper from Prof. Luc Montagnier.[20]. And also our paper on

the wave nature of matter, as well as the possibility of developing a wave-based (cancer) treatment.[23][24][33]

Concluding remarks

In this paper, we give an outline of an ongoing study to go beyond Freudian consciousness model. First, we review a recent book by our colleague, FS. Neutropsychology. Then we discuss possibility to reintroduce spirit into human consciousness. While we are aware that much remain to be done and we admit that this is only a sketch, we hope that this paper will start a fresh approach of research towards Pneumatological view of psychology in a realistic nonlinear consciousness space view.

This short article also highlights the fundamental problem with modern (Western) medicine. China has taken a step forward by recognizing their cultural heritage called TCM. Of course it must be acknowledged that modern (Western) medicine has been very advanced, but also many problems such as side effects and also many toxic materials due to synthetic materials. It is also well known that chemotherapy has a chance to work for less than 20%, so it is reasonable to argue that the 21st century requires a conceptual, new approach to treatment.

Message to young readers:

We hope this short article may inspire younger generation of physicists and biologists to rethink and renew their approaches to Nature, and perhaps it may also help to generate new theories which will be useful for a better future of mankind.

Postscript:

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[33] Our paper on non-particle view of DNA was once presented at the 2016 ICTAP conference in Makassar in 2016 by my long time co-author, Dr. Yunita Umniyati.

A. **A short note on plausibility of experimental vindication of the proposed model**

These authors just think of plausible vindication of the proposed intermediate state of fermion-boson, which may be called "*ferson*". It may have a chance to get into real observation at CERN etc. It may be indeed interesting for particle physicists who wish to continue the service period of CERN expensive facilities after discovery of Higgs particle. As the readers may already know, they tried to extend standard model to supersymmetry but it failed to come to detectors. Meanwhile, we just read that there are two possible theories which seem correspond to an intermediate statistics we're looking for: (1) anyon fractional statistics by Franck Wilczek, which we are not sure, (2) G. Gentile's statistics which predict the existence of "intermediate particle" between fermion and boson, but nobody has identified any experiment with such an intermediate particle so far. So, allow us to suggest interested readers to read and examine Giovani Gentile's original paper in *Nuovo Cimento* (1941).[34]

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[34] See his short biography: https://www.luisabonolis.it/Giovanni_Gentile_Jr_files/GentileCronoFoto.pdf
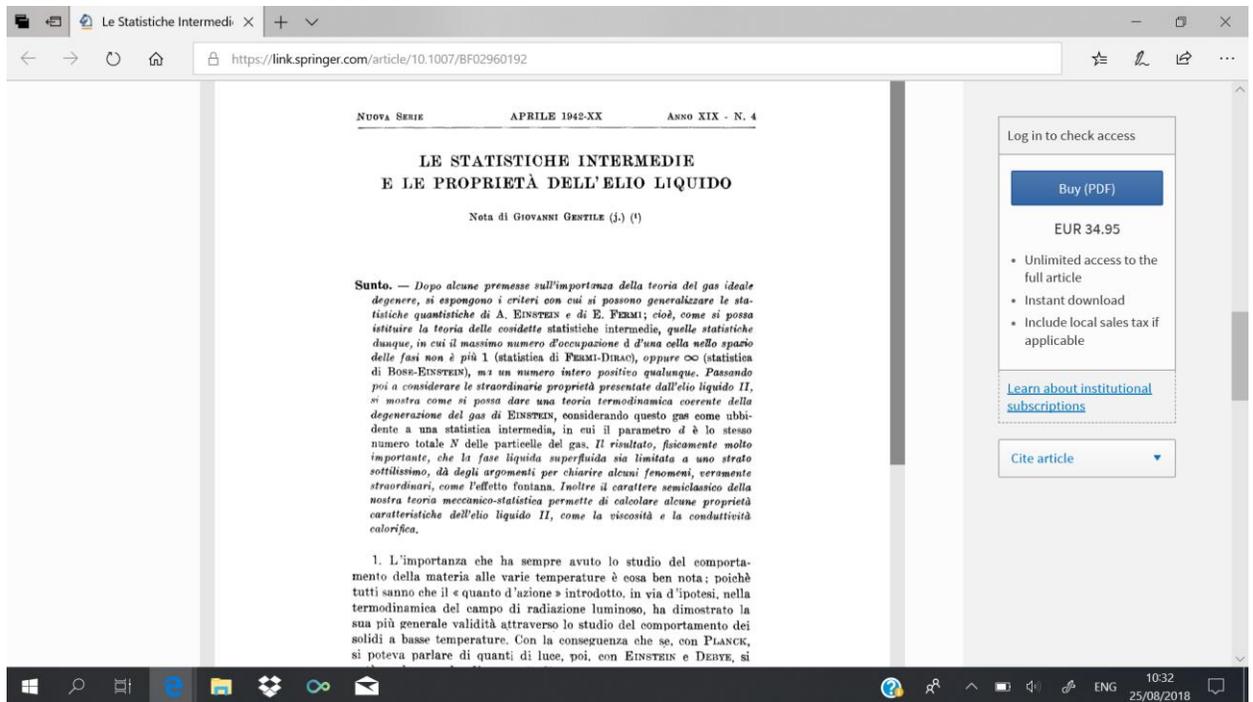
Picture 1: Screenshot of first page of G. Gentile's paper (1941)

We also plan to write up a short speculative paper on this topic, perhaps with title like: "On possible detection of intermediate state of fermion-boson particle from Klein-Bottle physics." But of course, this topic is to be discussed in other paper.

B. Toward Pneumatological Mind-Matter Interaction.

Various models have been proposed to suggest possibility of mind-matterinteraction, but mostly fall within QM theory. Other experiments seem to suggest that the effect is quite real, albeit many aspects remain mystery.

There are vast amount of mind-matter interaction models of living systems, from Stuart Hameroff etc's model, Semiotic Scaffolding model of Jesper Hoffmeyer (which Brian Josephson suggests a new term: *Semiophysics*) etc. See for instance [26-28].

Semiotic Scaffolding of living systems[*]

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ABSTRACT

The apparently purposeful nature of living systems is obtained through a sophisticated network of semiotic controls whereby biochemical, physiological and behavioral processes become tuned to the needs of the system. The operation of these semiotic controls takes place and is enabled across a diversity of levels. Such semiotic controls may be distinguished from ordinary deterministic control mechanisms through an inbuilt anticipatory capacity based on a distinct kind of causation that I call here "semiotic causation" to denote the bringing about of changes under the guidance of interpretation in a local context. Anticipation through the skilled interpretation of indicators of temporal relations in the context of a particular survival project (or life strategy) guides organismic behavior towards local ends. This network of semiotic controls establishes an enormously complex semiotic scaffolding for living systems.

Picture 2. Hoffmeyer's first page of his paper: *Semiotic Scaffolding of living systems*. [26]

On the Fundamentality of Meaning[1]

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Abstract

The mainstream view of meaning is that it is emergent, not fundamental, but some have disputed this, asserting that there is a more fundamental level of reality than that addressed by current physical theories, and that matter and meaning are in some way entangled. In this regard there are intriguing parallels between the quantum and biological domains, suggesting that there may be a more fundamental level underlying both. I argue that the organisation of this fundamental level is already to a considerable extent understood by biosemioticians, who have fruitfully integrated Peirce's sign theory into biology; things will happen there resembling what happens with familiar life, but the agencies involved will differ in ways reflecting their fundamentality, in other words they will be less complex, but still have structures complex enough for what they have to do. According to one approach involving a collaboration with which I have been involved, a part of what they have to do, along with the need to survive and reproduce, is to stop situations becoming too chaotic, a concept that accords with familiar 'edge of chaos' ideas.

Such an extension of sign theory (semiophysics?) needs to be explored by physicists, possible tools being computational models, existing insights into complexity, and dynamical systems theory. Such a theory will not be mathematical in the same way that conventional physics theories are mathematical: rather than being foundational, mathematics will be 'something that life does', something that sufficiently evolved life does because in the appropriate context so doing is of value to life.

Picture 3: Prof. Brian Josephson's first page of his paper [27]

But we prefer to suggest a simpler model based on the fact observed by Benveniste and also later by Maxim Trushin:[35] there is a kind of antenna or *sonic-mediated communication* between cells.[36] Therefore, we submit a model of mind-matter interaction by a new term: *Pneumatological cymatic mechanism*, i.e. by the human voice, soaked in the Holy Spirit, then it may affect the material/environment. Nonetheless, we admit that the exact mechanism of Pneumatological mind-matter interaction remains mystery, and this topic is reserved for future research. What we can say for now is: it seems the effect of mind-matter effect over long distance (more than 150km) has been reported, which suggests that this topic is very interesting for next research. [29]. (See also our previous papers on theo-cymatic view cosmology, in Part III).

Acknowledgement

Version 1.0: 20th July 2018, pk. 19:30

Version 1.1: 5th Aug 2018, pk. 19:45

Version 1.2: 20th aug 2018, pk. 5:21

Version 1.3: 21th aug 2018, pk. 11:15

Version 1.4: 21th aug 2018, pk. 15:37

Version 1.5: 25th Aug. 2018, pk. 10:44

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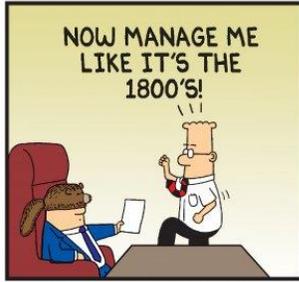
From Neutrosophic Psychology to Buberian approach of Relational Psychotherapy, Relational Pedagogy, and Relational Leadership

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Abstract

Continuing our previous paper, we gave an outline of an ongoing study of human consciousness scheme to go beyond Freudian mental model. First, we review a recent book by one of us: Neutropsychic personality. Then we discuss possibility to reintroduce spirit into human consciousness. To emphasize what we have outlined in a preceding paper, we consider the following: that human consciousness model should take into consideration "spirit" role, i.e. the mind-body-spirit as integral aspect, which view is neglected in the Freudian mental model. In this paper, we consider a further step: introducing "soul" as a different element of human consciousness. We also discuss a few possible applications of such an integral quadruple model of human consciousness, including relational psychotherapy, relational pedagogy, and relational leadership. While we are fully aware that much remain to be done and we admit that this is only a sketch, we hope that this paper will start a fresh approach of research towards more realistic nonlinear consciousness model.

"The easiest kind of relationship is with ten thousand people, the hardest is with one." - Joan Baez

Introduction

One of us, FS, recently published a new book, with title: *Neutropsychic personality*.[17] In that book, FS described possible extension of Freudian mental model: *id-ego-superego*, using his *Neutrosophic Logic* theory. See also [2][3].

He wrote among other things:

> "Neutropsyche is the psychological theory that studies the soul or spirit using the neutrosophy and neutrosohic theories. In other words: Neutrosophic Psychological Theory. It is based on triadic neutrosophic psychological concepts of the form (<A>, <neutA>, <antiA>). Neutropsychic Personality is a neutrosophic dynamic open psychological system of tendencies to feel, think, and act specific to each individual…"[17]

He goes on to develop a number of implications of this approach.

Later on, we thought that it would be necessary to push the boundary one step further, by considering a more realistic way to go beyond that classic Freudian mental model, i.e. by reintroducing the spirit into human consciousness model.

We are aware that many researchers have proposed such an extension, especially Italian tradition which was continually developed by students of Carl Jung, such as Assagioli and Piere Ferrucci, namely the *Psychosynthesis* movement.[1]

In our previous paper[1], we discussed a new integral view of human consciousness beyond Freudian mental model. Among other things, we consider the following: that human consciousness model should take into consideration "spirit" role, i.e. the mind-body-spirit as integral aspect, which view is neglected in the so-called Freudian mental model. [1]

And in this paper, we consider a further extension to previous triune model, by taking into account the role of "soul". And we also consider a few implications of such an integral quadruple[37] view of human consciousness, including *relational therapy*.

First of all, we will review early years of psychoanalysis.

Part A: Basic Principles

A review of early years of psychoanalysis theory
Four figures in early years of psychoanalysis are discussed here:
  a. Pierre Janet

> **Pierre Janet**, in full **Pierre-Marie-Félix Janet**, (born May 30, 1859, Paris, France—died February 24, 1947, Paris), French psychologist and neurologist influential in bringing about in France and the United States a connection between academic psychology and the clinical treatment of mental illnesses.
>
> Although the concept of dissociation had been described earlier, Pierre Janet was the first to show clearly and systematically how it is the most direct psychological defense against overwhelming traumatic experiences. He demonstrated that dissociative phenomena play

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[37] *Definition of quadruple* - consisting of four parts or elements. url: *https://en.oxforddictionaries.com/definition/quadruple*

an important role in widely divergent post-traumatic stress responses which he included under the 19th-century diagnosis of hysteria.

He stressed psychological factors in hypnosis and contributed to the modern concept of mental and emotional disorders involving anxiety, phobias, and other abnormal behavior. Janet's report (1882) of an unusual case of hypnosis and clairvoyance gained him the attention of neurologist Jean-Martin Charcot. As a Ph.D. candidate at the University of Paris, Janet studied automatic acts, and in his thesis (1889), which went into many editions, he introduced but did not amplify the concept of the unconscious. This work engendered a *later dispute* with Sigmund Freud over priority. At Charcot's invitation, Janet became director of the psychological laboratory at the largest Paris mental institution, the Salpêtrière Hospital (1889).[38]

Pierre Janet's therapeutic approach to traumatized patients was the first attempt to create a systematic, phase-oriented treatment of post-traumatic stress. Janet viewed the trauma response basically as a disorder of memory which interfered with effective action.[36] Carl Jung, on the other hand, took much of Janet's work, while developing analytical psychology, and added some of the spiritual aspects that Janet had denied. Ultimately, Janet was not successful in explaining the true nature of the psychological phenomena he studied, never resolving his personal struggle between the scientific (focusing on external, observable phenomena) and religious (focusing on internal, spiritual experiences) approaches to understanding life.[39]

b. Sigmund Freud

Fundamental to the debate between Janet and Freud were their views on non-conscious processes. Initially there were a number of similarities, but they diverged early, Janet developing a more structural model based on lateral splitting of the psyche, and Freud the more familiar depth model with vertical division.[35]

Furthermore, the term 'ego' originated in the mid- 19th century and by way of Freud became a cornerstone of western psychiatry. He proposed further subdivision into a tripartite structure to include the super-ego and the id. Subdivision of the self also had a

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[38] https://www.britannica.com/biography/Pierre-Janet

[39] http://www.newworldencyclopedia.org/p/index.php?title=Pierre_Janet

long ancestry, particularly in regard to sub-selves and multiple personality. The origins of modern self-psychology are to be found in the contributions of a group of psychiatric researchers prior to World War I. [35]

c. Carl Jung

Carl Gustav Jung (1875-1961) had a significant contribution to the psychoanalytical movement and is generally considered as the prototype of the dissident through the impact of his scission and the amplification of the movement he created in his turn (analytical psychology). In 1902-1903 he attended a traineeship in Paris with Pierre Janet, and then returned to Zurich and he was called senior physician at Burgholzli. It was in this context that Jung was introduced to Freud in 1907. Freud would be seduced by the prestige and personality of Jung and would soon see in him the spiritual son that could ensure the survival of psychoanalysis, so much so as Jung was not Jewish.[40]

Intense, professional and friendship bonds form between the two, with an ambivalence dominated by the inclination of Jung to underestimate himself in comparison with Freud, the fervor of his devotion to the "father" of psychoanalysis and oneiric hostility (emphasized by Freud in the common interpretation of dreams). Jung had a swift ascension in the hierarchy of psychoanalysis. He became the editor of *Jahrbuch*.

In 1908, he traveled to the United States and in 1910 he became the first president o the *International Association of Psychoanalysis*.[41] Since 1912 he became more and more distant in his writings, which would cause a scission materialized in 1914 by his resignation from all the positions he already held. By abandoning the meanders of psychosexuality, Jung would establish himself in the fields of spirituality and esoteric science.[42]

Jung, originally a follower of Freud, split from Freud in 1913, primarily because he believed that Freud presented a *reductive view* of human nature that left out transpersonal potentialities. Following the split, Jung began to formulate ideas that helped to explain transpersonal experiences and the possibility of transpersonal development.[38]

[40] https://www.carl-jung.net/biography.html
[41] https://www.carl-jung.net/biography.html
[42] https://www.carl-jung.net/biography.html

Figure 1. Jung Institut in Kusnacht, Zurich.[43]

d. Roberto Assagioli

Roberto Assagioli (1888–1974) was the first in Italy to adhere to the Freudian movement, although he soon began to pursue his own course. A nearcontemporary of Carl Gustav Jung (1875–1961), Assagioli embraced the emerging dynamic psychology of that period and developed it into a multilevel integrative vision of the human being, which he called ''psychosynthesis.'' In developing both the theory and practice of psychosynthesis, Assagioli contributed to the history of psychology by showing how dynamic and analytical psychology on the one hand and humanistic and transpersonal psychology on the other might be brought into synthesis. He was, with Jung, a major pioneer and exponent of transpersonal psychology.[38]

Initially a follower of Freud and psychoanalysis, Assagioli, along with Jung, was a pioneer of what later became known as transpersonal psychology. He had already begun exploring transpersonal themes before the official creation of psychosynthesis (Assagioli, 1927). In the 1960s he was one of the founders of the new field of transpersonal psychology and with Abraham Maslow played an important role both in giving the name ''transpersonal'' to the field and in bringing attention to important transpersonal concepts such as those of a higher or transpersonal unconscious, ''peak experiences'' (Maslow, 1962), and a transpersonal Self (Assagioli, 1973b).[38]

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[43] https://www.carl-jung.net/biography.html

Both Assagioli and Jung drew on Western philosophy, spirituality, and psychology. Assagioli particularly looked at Platonic and Judeo-Christian traditions and existentialism. Both were interested in occult (Jung, 1902) and parapsychological phenomena (Assagioli, 1976, 11.1–15, 75; 76; 77). However, Assagioli's general approach was pragmatic, practical, and synthetic and was directed towards benefits for society through transpersonal development in education and psychotherapy and through the practice of interpersonal and social psychosynthesis. As Jung drew inspiration from physicists, Assagioli drew inspiration from Eastern teachings, especially teachings on energy systems and energetic fields. He named *psycho-energetics* a fifth force of psychology after the fourth (*transpersonal*), and he explored its potential for future development (Assagioli, 1973c).[38]

In conclusion, Assagioli's view on spirituality differed from Jung's by focusing on a more direct and experiential approach. Assagioli specifically proposed meditations of various types as effective ways to achieve greater awareness, integration, and grounding in the transpersonal (Assagioli, 1963a; 1963b). Similarities, however, exist with the Jungian approach to analysis, symbolic imagery work, and creative-expressive methods. Both men emphasized the importance of the psychotherapeutic relationship as a vehicle for healing, in particular through transference-countertransference dynamics and through the living experience of the transpersonal dimension in human relationships.[38]

Our small contribution: from Neutrosophic Psychology Toward integral triune model of human consciousness

One of us, FS, recently published a new book, with title: *Neutropsychic personality*.[17] In that book, FS described possible extension of Freudian mental model: *id-ego-superego*, using his *Neutrosophic Logic* theory. See also [2][3].

He wrote among other things:

"Neutropsyche is the psychological theory that studies the soul or spirit using the neutrosophy and neutrosohic theories. In other words: Neutrosophic Psychological Theory. It is based on triadic neutrosophic psychological concepts of the form (<A>, <neutA>, <antiA>). Neutropsychic Personality is a neutrosophic dynamic open psychological system of tendencies to feel, think, and act specific to each individual…"[17]

He goes on to develop a number of implications of this approach, including a model of human memory as follows:
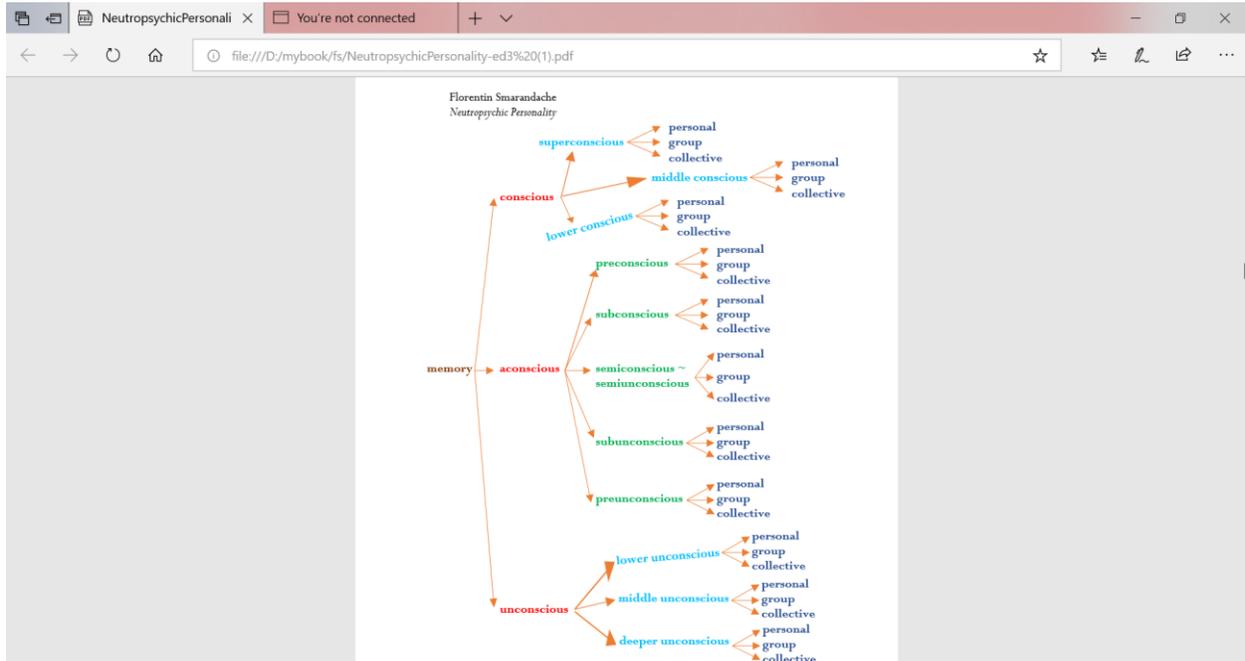
Figure 2. A model of human memory based on Neutrosophic Psychology. After Smarandache [17, p.41]

But it is not our intention to discuss human memory model in this paper, this topic is reserved for future investigation.

Later on, we thought that it would be necessary to push the boundary one step further, by considering a more realistic way to go beyond that classic Freudian mental model, i.e. by reintroducing the spirit into human consciousness model.

We all know that Hebrew's thought on human being is integral, i.e. the wholeness of *body-mind-spirit*. But how can we come up with a model of human consciousness based on the Bible?

As a starting point, let us begin by the Greatest Commandments:

> **Matthew 22:37-40 King James Version (KJV)**
>
> [37] *Jesus said unto him, Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind.*
>
> [38] *This is the first and great commandment.*
>
> [39] *And the second is like unto it, Thou shalt love thy neighbour as thyself.*
>
> [40] *On these two commandments hang all the law and the prophets.*

Our re-reading of the above commandments lead us to model a Trinitarian dialogue within human self: *God, self, and others.*[44]
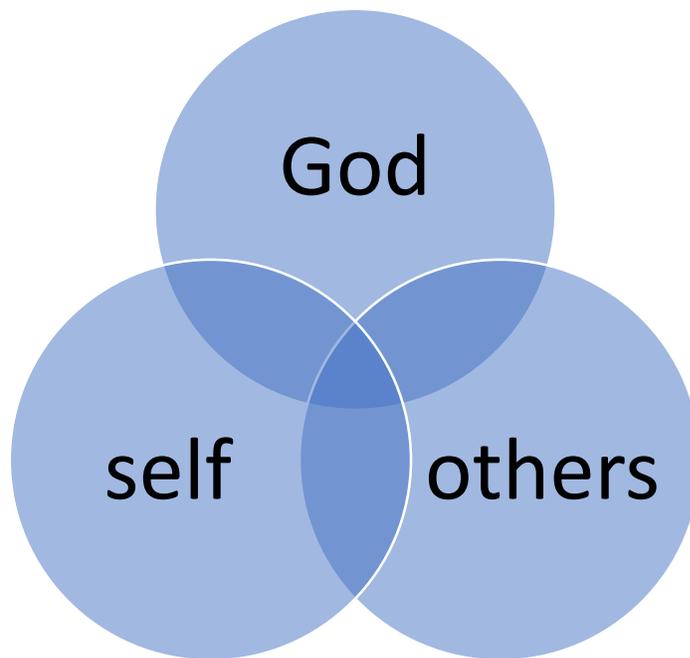
Figure 3. Three directions of human love based on The Greatest Commandments in Matthew 22:37-40.

Comparing with Adam Grant's give and take model of human basic tensions inside our mind. Let us consider parallels, i.e. "*taking*" reflects selfishness/greediness motive of ego, and "*giving*" reflects altruism motive of conscience.

In other words, now we have two entities in human consciousness: ego and conscience. There is always deep tension between ego and consciousness, between selfishness and altruism. Along these two poles, we need a third entity which has purpose to ease and being intermediary between these two motives. In this problem, along with *Neutrosophic Logic [2]*,[45] allow us to

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[44] For an alternative reading of Mat. 22, see Vern Poythress's article: https://frame-poythress.org/the-greatest-commandment-the-very-heart-of-the-matter/

[45] As a simple introduction to Neutrosophic Logic, allow us to quote from ref. [3]: "Neutrosophic Logic (NL) is a Theory of Everything in logics, since it is the most general so far. In the Neutrosophic Propositional Calculus a neutrosophic proposition has the truth value (T, I, F), where T is the degree of truth, I is the degree of indeterminacy (or neutral, i.e. neither truth nor falsehood), and F is the degree of falsehood, where T, I, F standard or non-standard subsets of the non-standard unit interval]-0, 1+[. In addition, these values may vary over time, space, hidden parameters, etc. Therefore, NL is a triple-infinite logic but, by splitting the Indeterminacy, we prove in this article that NL is a n-infinite logic, with n = 1, 2, 3, 4, 5, 6, … . The neutrosophic component of Indeterminacy can be split into more subcategories, for example Belnap split Indeterminacy into: the paradox (<A> and <anti-A>) and uncertainty (<A> or <anti-A>), while truth would be <A>, and falsehood <anti-A>. This way Belnap got his four-

submit wholeheartedly that the third entity, is actually no other than "the spirit." (*pneuma* in Greek, *ruach* in Hebrew)

God
(spirit)

self
(ego)

others
(conscience)
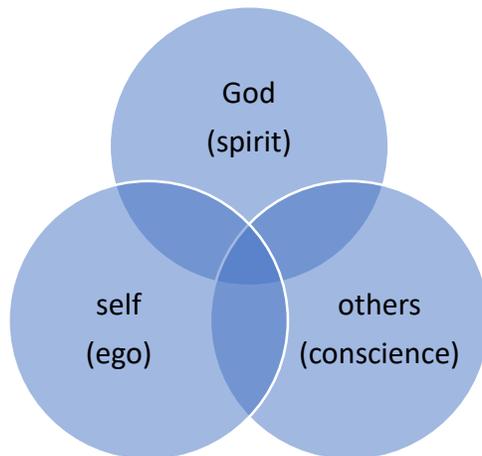
Figure 4. A model of human consciousness based on Greatest Commandments in Matthew 22:37-40.[46]

The exact role of human spirit is to enlighten both ego and conscience. Some readers may raise question at this point: *what is new here*? It seems similar with Freud's id-ego-superego model. (This proposed model is an extension of Neutropsychic model, see [17]).

No, it is really in contrast with Freud's model which is purely *materialistic* in origin. The notion of spirit is rejected in Freud's model.

What we propose here is sometimes called transpersonal psychology:

> "**Transpersonal psychology** is a sub-field or "school" of **psychology** that integrates the **spiritual** and transcendent aspects of the human experience with the framework of modern **psychology**. It is also possible to **define** it as a "**spiritual psychology.**"[47]

An interesting argument spiritual psychology has been discussed in Santa Monica site:

> "If you look up the word "psyche" in the dictionary, you will find "breath, principle of life, Soul." But if you look up "psychology," you will find "the science of mind and behavior." Somehow, in the translation from essence to practice, the most important aspect of "psyche" has been lost. At the University of Santa Monica, we recognize our task as reintegrating the spiritual dimension back into the essence of an authentic psychological inquiry. It is this reintegration that evokes the emergence of a Spiritual Psychology.
>
> Spiritual Psychology is the study and practice of the art and science of Conscious Awakening. To engage in this genre, we must begin by distinguishing the essence of human evolution—what does it

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valued logic. In neutrosophy we can combine <A> and <non-A>, getting a degree of <A> a degree of <neut-A> and a degree of <anti-A>. <A> actually gives birth to <antiA> and <neut-A>.

[46] This model may be compared to Jung's personality model, which includes individual unconscious and collective unconscious.

[47] https://psychcentral.com/blog/6-facts-about-transpersonal-psychology/

mean to evolve? In short, it means learning how to identify, recognize, and navigate successfully within the Context of Spiritual Reality. Practically, it means learning how to surrender—or let go of—anything that disturbs one's peace. It also means sacrificing our illusions of separation. Essentially, this "surrendering" and "sacrificing" is work that can and has been called "healing," which includes healing on the physical, mental, and emotional levels in service to the deeper revelation of who we truly are as Loving, Peaceful, Compassionate, and Joyful beings. We refer to this level of awareness as the Authentic Self."[48]

Columbia University also offers SMBI degree (spirituality, mind, body institute), which is "an interdisciplinary approach to learning, in which students explore multiple paradigms — neuroscience, spiritual psychology, innovative and ancient healing practices, inspired creativity and the arts, visionary education and social entrepreneurship — in service of the creation of a *society rooted in spiritual values*."[49]

In the last few days, we begin considering a further improvement of our model: from triune model to become quadruple model, by introducing the notion of "soul."

Actually, the role of soul is immediate from the psychology term itself, although literally speaking "psyche" in Greek can mean mind, soul or spirit. (We know, that there is specific Greek word for spirit: pneuma).

According to Neal Goldsmith:

> "The word psychology comes from the Greek psukhe, meaning "soul," "spirit," "mind," "life," and "breath," combined with the Greek logos, here used as "statement," "expression," and "discourse," more often thought of today in the form of "-ology," as "the study of." Although the academic and clinical discipline of psychology has become a medical-and therefore a pathology-oriented-field, prior to the late 1800s, the *study of our inner mental life was the study of our soul*, our deepest self or essence."[39]

However, Jung himself carefully distinguishes between psyche and soul, as it is clear that in German, the word "seele" can mean both: psyche and soul.

> "I have been compelled, in my investigations into the structure of the <u>unconscious</u>, to make a conceptual distinction between *soul* and *psyche*. By psyche, I understand the totality of all psychic processes, <u>conscious</u> as well as unconscious. By soul, on the other hand, I understand a clearly demarcated functional complex that can best be described as a "personality". (Jung, 1971: Def. 48 par. 797)
>
> [The translation of the German word *Seele* presents almost insuperable difficulties on account of the lack of an English equivalent and because it combines the two words "psyche" and "soul" in a

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way not altogether familiar to the English reader. For this reason some comment by the Editors will not be out of place.]

[In previous translations, and in this one as well, *psyche*—for which Jung in the German original uses either *Psyche* or *Seele*—has been used with reference to the totality of *all* psychic processes (cf. Jung, *Psychological Types*, Def. 48); i.e., it is a comprehensive term. *Soul*, on the other hand, as used in the technical terminology of analytical psychology, is more restricted in meaning and refers to a "function complex" or partial personality and never to the whole psyche. It is often applied specifically to "anima" and "animus"; e.g., in this connection it is used in the composite word "soul-image" (*Seelenbild*). This conception of the soul is more primitive than the Christian one with which the reader is likely to be more familiar. In its Christian context it refers to "the transcendental energy in man" and "the spiritual part of man considered in its moral aspect or in relation to God." ... — Editors.] (Jung, 1968: note 2 par. 9)" [40]

Therefore, although we don't wish to complicate the matters, we come to this understanding: to study human consciousness in depth, we need to consider the four elements: mind, body, soul, spirit. We call it a quadruple model of human consciousness.

A simplified diagram can be used to represent our quadruple model:
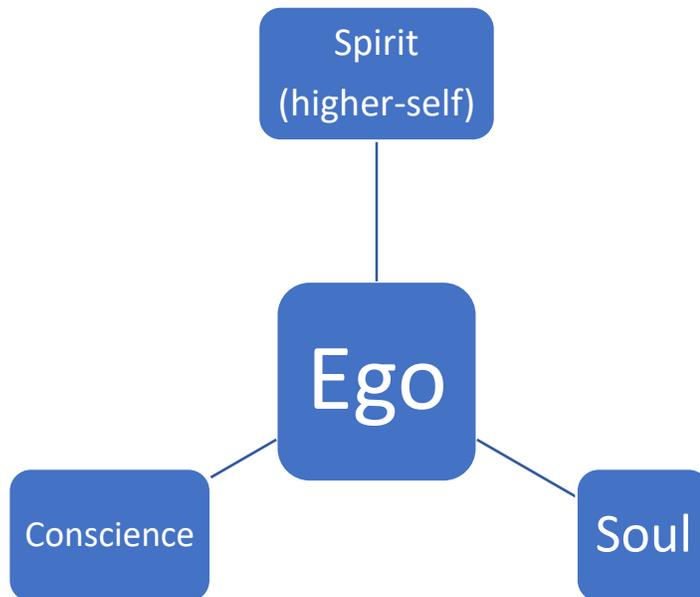
Figure 5. An integral quadruple model of human consciousness inspired by the Greatest Commandments in Matthew 22:37-40. (It looks more or less similar to a widget spinner, so you may also call it: "A widget spinner model of human consciousness.")

Figure 6. An example of widget spinner

We are aware that this quadruple model is far from complete, and we intend to develop this model further later.

Nonetheless, one characteristics of our model is that the four elements are always in constant communications (dialog) among themselves, that is why we prefer to call this model: A relational quadruple model of human consciousness. If we are allowed to borrow a term from Trinitarian theology discourse: "*perichoresis*." In other words, we believe that human being was created to be in close relationship with the *Great Dance* of The Trinity. See for instance [41]. Now, readers may ask: what about the name of our model: following Jung's lecture to emphasize the four-fold as a basic requirement of completeness:

> "Ancient Greek philosophy used quaternarian thinking. For Pythagoras, not three but four played the major role as, for example, in the so-called Pythagorean Oath. There it is said of the number four, the *tetraktys*, that "it has the roots of eternal Nature." Also in the Pythagorean school the opinion reigned that the soul was not a triangle, but a quadrangle. The origin of these views lies somewhere in the dark prehistory of the Hellenistic spirit. The quaternity is an archetype that occurs universally.
> Four is the logical prerequisite for every determination of totality. If one wants to make such a determination, it must have a fourfold aspect. If, for example, one wants to designate the totality of the horizon, one names the four cardinal points…"[42]

Therefore we would propose to call this model: *quadruple Neutrosophic Psychology* model of human consciousness.

Introduction to Relational Therapy or the healing effect of compassion-love

Nelson Mandela once remarked: "*Our human compassion binds us the one to the other – not in pity or patronizingly, but as human beings who have learnt how to turn our common suffering into hope for the future.*"

Yes, we can accept his remark, but how to speak of compassion in terms of cancer treatment. Is there healing effect of compassion and love? We will take a deeper look into these questions in this section, which discussion allow us to submit a new method called: Relational Therapy.

First of all, let us admit that although a growing body of evidence suggests that giving to (helping) others is linked reliably to better health and longevity to the helper, the mechanism remains a mystery. However, there are recent papers which seem to support such a wide-held belief, see for instance [7].

Other research also suggests the neuroscience effect of *pro-social* behavior.[8]. A recent book by Adam Grant from Wharton also reveals on how giving to others may lead to better and happier life. [10]

Key ideas of Adam Grant can be summarized as follows:

> "Depending on the situation, people can adopt different behaviors – they can take, give, or exchange. But usually, everyone has a dominant model that determines their behavior. All three models have their advantages and disadvantages. However, the author believes, and his view is supported by real-life experiences that givers receive fewer benefits, as they are guided by the interests of others and forget about their own interests. The link between giving and positive emotion is a cornerstone of Positive Psychology. Giving makes us happy. Studies have shown when subjects are given $5 with instructions to give the money to a stranger, their **happiness** increases more than subjects who are given $20 to spend on themselves (Dunn et.al. 2008)."[10]

And a significant work in this direction of research has been written: "The compassion connection."[9]. Preface of their book begins with these words:

> "As human beings, we are born with an innate and nearly limitless capacity for caring and compassion. We recognize when others around us are hurting; as the latest neuroscience has shown, we quite literally feel their pain—imaging studies have demonstrated that the same networks in the brain are activated whether people receive a painful stimulus themselves or are merely witnessing someone else receiving it. And we want to help. In fact, the human brain is actually wired for cooperation and giving. But we're not always good at it. We say the wrong things, or we zero in on the wrong problems. Often we manage to do more harm than good, causing hurt feelings and even damaging relationships. But there is another way. In *The Compassionate Connection: The Healing Power of Empathy and Mindful Listening*, I explain that we all have the astounding ability to help others in a way that prompts their healing from within and strengthens our bonds with them—while doing emotional and physical good for ourselves in the process. Indeed, some social psychologists have theorized that giving may enhance the giver's self-interest more than receiving. This is a two-way street."[9]

The author also tells:

> "*I learned the importance of the therapeutic ceremony and how the actual process of delivering care can dramatically enhance the effectiveness of what is prescribed.* Research now shows how this is possible—that is, how personal interactions can actually have physiological effects on patients."[9]

In fact, that corresponds to the definition of integrative medicine:

> "According to the Academic Consortium for Integrative Medicine and Health, it "reaffirms importance of *the relationship* between practitioner and patient, focuses on the whole person, is informed by evidence, and makes use of all appropriate therapeutic and lifestyle approaches, healthcare and disciplines to achieve optimal health and healing."[6] Much of the information I had absorbed during my fellowship constellated around how to *stimulate self-healing mechanisms* within my patients' bodies. This is part of what I like to think of as the "mystery and awe" of medicine." [9]

That is what we argue in this section, that caring and compassion through authentic relationship can lead to self-healing process. That is why we call it: "*Relational therapy*," to emphasize the role of loving in healing, just as we heard numerous times in Greatest Commandments as quoted above.

While we are aware that the ideas presented here may be not complete yet, but we are convinced that these ideas of authentic relationship, caring and compassion are supported by solid body of evidence. And they may hold the key to autoimmunity system of human body. Again, love and self are inseparable. In other words, a man or woman who do not want to care and practice compassion towards other people, we cannot call them just "*selfish*", instead they are "*selfless*" – i.e. they are losing the meaning of being a human.

Enough with some basic principles, in the next 3 sections we will discuss few applications of these concepts: Relational Psychotherapy, Relational Pedagogy, and Relational Leadership.

Part B: A few applications

Introducing Relational Psychotherapy

First of all, let's ask a basic question: what constitutes a good therapy session? A long series of discussion, where the patient should recover his/her early childhood traumas? Or a more direct approach called Cognitive Behavioral Therapy?

OK, let us start with a joke:

Joe has been seeing a psychoanalyst for four years for treatment of the fear that he had monsters under his bed. It had been years since he had gotten a good night's sleep. Furthermore, his progress was very poor, and he knew it. So, one day he stops seeing the psychoanalyst and decides to try something different.

A few weeks later, Joe's former psychoanalyst meets his old client in the supermarket, and is surprised to find him looking well-rested, energetic, and cheerful. "Doc!" Joe says, "It's amazing! I'm cured!"
"That's great news!" the psychoanalyst says. "you seem to be doing much better. How?"
"I went to see another doctor," Joe says enthusiastically, "and he cured me in just ONE session!"
"One?!" the psychoanalyst asks incredulously.
"Yeah," continues Joe, "my new doctor is a behaviorist."
"A behaviorist?" the psychoanalyst asks. "How did he cure you in one session?"
"Oh, easy," says Joe. "He told me to cut the legs off of my bed."[50]

Some other known approaches are called Gestalt Therapy which corresponds to Logotherapy. According to common practice, gestalt therapy emphasizes the therapeutic relationship between client-therapist:

"Gestalt therapy is practiced in the form of exercise and experiments. It can be administered in individual or group settings. In general, exercises are somewhat established practices in gestalt therapy designed to arouse action, emotion, or goals from the person in therapy. The therapist and person in therapy can then examine the result of the exercise in order to increase awareness and help the person understand the "here and now" of the experience.

In contrast to exercises, experiments arise throughout the development of the therapeutic process and **therapeutic relationship**. They are a core component of gestalt therapy and allow the person in therapy to understand different aspects of a conflict, experience, or mental health issue.
The empty chair technique is a quintessential gestalt therapy exercise that places the person in therapy across from an empty chair. He or she is asked to imagine that someone (such as a boss, spouse, or relative), they, or a part of themselves is sitting in the chair. The therapist encourages dialogue between the empty chair and person in therapy in order to engage the person's thoughts, emotions, and behaviors. Sometimes the roles are reversed and the person in therapy assumes the metaphorical person or part of a person in the chair. The empty chair technique can be especially useful for helping people become mindful of the whole situation and forgotten or disengaged pieces of their own self."[51]

What we would emphasize here is the "therapeutic relationship" phrase. We just realize that what's important is not just relationship between client-therapist per se, but also between client

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[50] http://www.workjoke.com/psychologists-and-psychiatrists-jokes.html
[51] https://www.goodtherapy.org/learn-about-therapy/types/gestalt-therapy

and his/her family, his/her friends, etc. In other words, we believe that human being is created to be woven into his/her social fabric, and most of the time this can have a healing effect. According to Kathryn Stauffer et al:

> "Traditionally, the field of psychotherapy, including psychoanalysis, has been fragmented and riddled with factions and specialities and different modalities. This has always left both users and referrers with a bewildering variety of therapies and with the question: which is the most effective for making clients better? There have been many attempts to answer this question, and many serious researchers have studied a variety of outcomes. Every first-year student knows that pretty much all of these studies have yielded the one answer: **It's All In The Relationship.** Psychotherapy modalities appear to be more or less equally effective, and clients working with therapists from different modalities emphasize that the therapeutic relationship has been the main factor that made a difference to their wellbeing. … The term Relational Psychotherapy, in the way it is understood nowadays, was first used in the US by Greenberg and Mitchell in 19831, and they saw it as a bridge between the traditions of interpersonal relations and object relations. For relational theorists, mind always emerges and develops in the context of interpersonal relationships. In their view, our internal world acts as a kind of filter through which we experience ourselves and the world around us. It arises out of external experience by a process of internalisation. This filter helps us to function in the world, but it is also a limitation, especially if the experience it was built from originally was limited or damaging. Such 'bad' early experience will then lead to a compulsion to re-enact it in an effort to try and make it better. Forming relationships with others offers us an opportunity to widen our perspective by giving us a deeper sense of our own and the other's humanity, and this experience can enable us to transcend our early introjects."[18]

There is deep truth behind a famous saying by Malcolm X:

> ""*When I is Replaced by We, Illness Becomes Wellness*!"[52]

While we don't see this is an entirely new to psychotherapy, our proposed method is to begin with Martin Buber's famous philosophy: "*I and Thou,*" where he emphasizes the significant role of dialogic-communications. And that is why we consider relational psychotherapy is more related to Buberian philosophy. See also [19]

Introducing Relational Pedagogy

A definition of pedagogy tells us:

"The method and practice of teaching, especially as an academic subject or theoretical concept."[53]

And its origin goes back to 16th century:

"Late 16th century: from French pédagogie, from Greek paidagōgia 'office of a pedagogue', from paidagōgos (see pedagogue)."[54]

But we can also ask: what constitutes a good pedagogy? That would require a whole bunch of academic papers.

We shall admit that we are not specialist in education/pedagogy theories. But long time ago, one of us (VC) read a famous book at the time by Paulo Freire, "*Pedagogy of the oppressed.*"[55] He has a reputation as education philosopher which brought him to do join work with many organizations, including the World Council of Churches. One word that we learned from Freire is the significance of "*conscientization.*" According to Arthur Lloyd:

"*Paulo Freire*, Brazilian educator, has elaborated an educational theory within the framework of a theory of radical social change and expressed in a literacy training program. A central concept is "*conscientization*," and development of critical consciousness through a process of reflection and action."[20]

While we are not so much in agreement with his *post-marxian* approach, we accept that conscientization is one of the most important aspect in education. But not only that, a good educator should also give special attention to teach his/her students on how to respect and accept the others (that need a dialogic view), to communicate, to cooperate, and to have compassion. In our opinion, such a set of new *soft skills* are very important especially in the light of the rise of digital networks, which imply that anyone connected to digital networks will be exposed to numerous expressions of cultural and philosophical differences. Therefore, all these skills *become conditio sin qua non* in this digital and social media age.

We consider that Martin Buber's dialogic philosophy can be useful for this goal too, which leads us to consider "*Relational Pedagogy.*" The good news here is that such an idea "Relational Pedagogy" has been discussed for some years by a number of academicians. See [22][23][24][25].

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[53] https://en.oxforddictionaries.com/definition/pedagogy
[54] https://en.oxforddictionaries.com/definition/pedagogy
[55] https://selforganizedseminar.files.wordpress.com/2011/08/freire_pedagogy_oppresed1.pdf

Introducing Relational Leadership

Before we discuss the need for dialogic/relational leadership, let us remind the readers on some basic of management views. It is known for quite long time, that in management, managers with such a typical desire to control everyone else are called Type-X managers.[56] But we know that there are other types of management:

- Type Y[57]
- Type Z (William Ouchi)[58]

Now, speaking in terms of technologies, we can put these facts into categories as follow:

a. Type X technologies
b. Type Y technologies
c. Type Z technologies

In other words, this author believes that technologies should be designed from the start: to control and exert hegemony, or to humanize. But some readers may argue: *but isn't technology neutral, just like a knife can be used for cooking food or to harm people?* Yes, some technologies are neutral from ethical premises, but most of them has a special purpose in mind. Let say, when a chemical scientist begins research in sarin gas, does he/she has some kind of evil mind in plan? Of course.

Some other readers may ask: is it possible to devise technologies to humanize and promote good side of human being? Absolutely yes.

Prof. Adam Grant in his book: *Give and Take* made a good point while comparing Craiglist and Freecycle. While these two network are popular, there is difference between them: Craiglist promotes matching behavior, while Freecycle promotes giving behavior. The good news is that Adam Grant found that through Freecycle, users find themselves truly motivated into giving behavior, even if initially they have more taker and matcher behavior.[28][29]

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[56] https://www.inplantgraphics.com/article/are-you-theory-x-theory-y-leader/
[57] http://hrmars.com/admin/pics/1922.pdf
[58] https://studiousguy.com/william-ouchis-theory-z-of-leadership/

In other words, certain choice of technologies can move the users to exercise their goodness and giving behavior (altruistic and humanistic side), and other choice can promote users to become more selfish and taker.[59]

Before ending this paper, allow me to push the boundary of our management thinking by submitting a fourth type of technology style:

d. Type D technologies. What I mean with D technologies is technologies who stop to see human being (users) as "IT", but begin to see them as "THOU" (subject). The "D" letter is named after "dialogue", a human virtue promoted by Martin Buber, a famous existential philosopher with his book: *I and Thou*. While Buber's thinking has been known for long time in psychotherapy etc., there is deficiency in thinking in terms of dialogic-management style. However, there are some works who consider dialogic-relational leadership (sometimes called *Nordic style*). Therefore, we think there is still hope that we can turn such a dialogic-relational leadership into a new type of technologies approach, beyond "*controlling them all*" management style of 1930s. In other words, perhaps the essence of problem with *techno-corporatocracy* is their *assumption on humanity* is caught in early 20th century, which is not compatible anymore with the value system of younger generations in this 21st century. See [30-34]

At this point, some readers may ask: how can we put such a dialogic-leadership along with Type D technologies into practice?

Yes, that question is quite difficult to answer, especially considering that e-commerce and all sorts of hegemonic practices which predominating the Internet nowadays.

But it is not all the story. If we return to the early days of the WWW, its inventor Tim Berners-Lee did have a more egalitarian and noble motives in mind:

> "Tim Berners-Lee and his colleagues faced a number of tough challenges when inventing the web, including having to build early browsers and protocols from scratch and overcoming initial

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[59] In the meantime we admit that corporate leaders (CEO) who want to promote more altruistic and giving behaviour often will face resistance from board of shareholders etc., partly because of various pressures exerted to them from internal and external sources. This author read somewhere that CEOs in USA were pressed day by day to keep their stockprice high; and failure to keep that market value can result in termination. At the opposite side, some writers argue that most Japanese CEOs seem to not being pressed by shareholders to keep high in daily results. In other words, USA companies are more "*short-term result oriented*", while Japanese companies are more "*long term goal oriented*." There are some interested references of such cultural differences, see for instance: http://clearlycultural.com/geert-hofstede-cultural-dimensions/long-term-orientation/; http://japanwatching.com/culture/92-how-different-are-the-japanese

scepticism (his original idea was labelled 'vague but exciting' by his boss at CERN). The nascent web also needed to be brought into being under the radar, and the terms for the release of its code carefully formulated to guarantee its free availability for all time. It took 18 months to persuade CERN that this was the right course. "*Had the technology been proprietary, and in my total control, it would probably not have taken off*. The decision to make the web an open system was necessary for it to be universal. You can't propose that something be a universal space and at the same time keep control of it," said Berners-Lee in 1998."[60]

Therefore, it is not an overstatement to say that the WWW has been designed to be *decentralized* network, though over the course of time, it turned out to be centralized.

But that is not the end of the story, Tim Berners-Lee and his team from MIT nowadays work out a plan to reclaim his invention to be more in tune with his initial invention. They build a new startup called "*Inrupt*" with a new kind of decentralized platform: **Solid**.[61]

Concluding remarks

As a further step from what we have outlined in a preceding paper, we consider the following: that human consciousness model should take into consideration "spirit" role, i.e. the mind-body-spirit as integral aspect, which view is neglected in the so-called Freudian mental model.

In this paper, we consider a few applications derived from such an integral triune view of human consciousness, including Relational Psychotherapy, Relational Pedagogy, and Relational Leadership. We also introduce a new term: Type-D management style, implying possibilities to develop Type-D technologies in the future.

While we are aware that the ideas presented here may be not complete yet, but we are convinced that these ideas of authentic relationship, caring and compassion are supported by solid body of evidence.

To summarize key ideas in this paper, instead of repeating the Cartesian old adage: cogito ergo sum (I think therefore I am), probably it is much better to consider a new phrase: *I love therefore I am* (we are not sure about Latin version, may be something like this: "*Amo cogito ergo sum.*")

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[60] https://www.computing.co.uk/ctg/news/3036546/decentralising-the-web-the-key-takeaways
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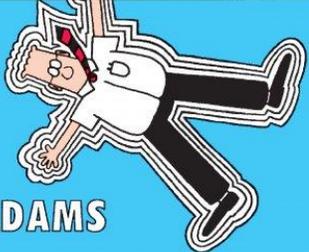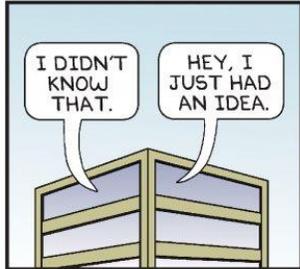
A few remarks on how collective emotion and unyielding determination may contribute to a football outcome:
What we can learn from SpongeBob mentality

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Introduction

Today there will be a match between France and Belgium in World Cup. As we eagerly wait for their performance, allow me to drop a few remarks on how we can enjoy a football game like today.

What makes football so interesting? Not only because of its unpredictability. It is more perhaps because the players show sportive, although occasionally some players choose to play dirty, tackling hard and so on. From such a game, we can sublimate our emotions toward the entire life. Even for those who live in miserable situation, watching football can release a bit their stress.

Over the last few days, while watching some earlier matches in this World Cup 2018 in Russia, I asked: given almost equal skills between two teams, what can affect the outcome of the game?

Yes, flair and skill and speed are all very important. But that's not all that matters. If two teams have more or less equal skills and speed, there should be more factors to consider. I try to condense this problem into: collective emotion and determination.

Collective emotion

A number of recent research suggests that positive collective emotion of a sport team can affect greatly the outcome of the game.[2]

According to Meneghen et al.[3]:

> "In the organizational context, the importance of emotions is firmly established, and in recent times researchers have begun to turn their attention toward understanding the processes and outcomes of collective emotion (Rhee 2007). Three main mechanisms have been proposed to explain the emergence of (positive) collective emotion development, namely emotional contagion (Hatfield et al. 1992), emotional comparison (Schachter 1959), and empathy (Hoffman 1985). Whereas emotional contagion denotes a subconscious process of aligning each other's affective reactions, emotional comparison is a more conscious mechanism to compare one's own feelings with those expressed by others, in order to show appropriate and congruent affective reactions (Barsade 2002). In contrast, empathy is based on vicarious affect and team members show similar affectivity by deliberately assuming others' psychological points of view (Nelson et al. 2003). In accordance with these mechanisms, affective responses and emotions within team members can converge and the team can easily achieve a collective mood. Subsequently, in the same way as individuals (Fredrickson and Losada 2005), positive collective emotions are associated with an enhancement in the availability of team resources and resilience to adversity. This theoretical and empirical

evidence allows us to go a step further in the B&B theory, in order to verify whether the relationship between positive emotions and resilience is replicated at the collective (team) level in the work context. We therefore expect that:

Hypothesis 1: Collective positive emotions in work teams are positively related to team resilience."

Not only, a good collective emotion will affect resilience, but they also affect the outcome:

"Finally, we postulate that the relationship of positive emotions to team performance is fully mediated by resilience. In fact, in accordance with the B&B theory, positive emotions make it easier to build durable personal resources, and people who are particularly adept at self-generating positive emotions are more likely to be resilient. By contrast, no rationalization was given about the possible relationship between positive emotions and behavioral outcomes, such as work performance. Moreover, previous evidence about the thesis of "happy-productive workers" showed that (trait) psychological well-being was related to job performance, whereas (state) positive mood was not (Wright et al. 2004). Consequently, we proposed that team resilience fully mediates the relationship between collective positive emotions and team performance. That is, collective positive emotions help to build team resilience, which in turn increases team performance. Hence, we expect:

Hypothesis 3: Team resilience will mediate the relationship between collective positive emotions and team performance. Specifically, we expect collective positive emotions to be positively related to team resilience, which in turn is positively related with team performance."[3]

In other words, a team must have a positive feeling about themselves. That is way, it is important for a coach to keep a high positive attitude to the team. More than that, during the game, a team with positive collective emotion will experience "flow."

After all, the entire effect of a game is "flow."

"Games engage us with challenges. They are designed to create what researcher Mihály Csikszentmihályi calls "flow," which is when we're immersed in something enough to forget the passage of time. We're never bored or overwhelmed because good games keep a perfect balance of hard but not too hard, easy but never too easy. And as we improve, games up the difficulty. We're always stretching our abilities just enough to keep us hooked. McGonigal explains: Csikszentmihályi's research showed that flow was most reliably and most efficiently produced by the specific combination of self-chosen goals, personally optimized obstacles, and continuous feedback that make up the essential structure of gameplay. "Games are an obvious source of flow," he wrote, "and play is the flow experience par excellence.""[1]

Unyielding determination

From the above sources, we can expect that team resilience and collective emotion will affect the outcome. But are they enough? I think there is one more is necessary: unyielding determination.

After skills, speed, flair etc…you need to have unyielding and unbroken mentality…which is also called: endurance, persistence, perseverance etc. And this trait will influence on your persistence and may be stubbornness when you fall. As Angela Duckworth, the author of Grit, wrote:

"One of my favorite quotes is from the playwright Samuel Beckett: "Ever tried. Ever failed. No matter.Try Again. Fail again. Fail better."Like so many things in life, learning from failure is easier said than done. It takes courage to fall on your face and get up again, knowing you'll probably fall again at some point. One thing you can do is model a resilient, optimistic, unashamed reaction to failure."[4]

To illustrate this point of unyielding determination or perseverance, let us quote a story of Jure Robic, from the introduction of Eric Barker's book: [1]

"In a piece for the New York Times, Dan Coyle revealed the edge Robič had over his competition that rendered him the greatest rider ever in the Race Across America: His insanity. That's not an exaggerated way of saying he was extreme. It's a literal way of saying when Robič rode, he utterly lost his mind. He became paranoid; had tearful, emotional breakdowns; and saw cryptic meaning in the cracks on the street beneath him. Robič would throw down his bike and walk toward the follow car of his team members, fists clenched and eyes ablaze. (Wisely, they locked the doors.) He leapt off his bike mid-race to engage in fistfights with mailboxes...."

And what about SpongeBob?

At this point, perhaps we can learn from Spongebob mentality. He always try to do his best to help friends, even at times it turned into a mess.

Let us quote from Yalda T. Uhls (see appendix):

"He seems to me to represent a child, someone who *lives for the moment*, has no idea about the value of money or power and could care less about social status or physical

> pursuits. He enjoys hanging out with his friends, blowing bubbles and working hard at his job because he is excellent at grilling patties,…"

I think a key phrase here is "lives for the moment." Enjoying the "now" is very special trait commonly observed in children. Look while they are playing…they play seriously, immersed in the game, yes sometimes they have dispute, but they get back to that game, just to enjoy the moment.

In the words of Huizinga, who coined term **homo-ludens**, play as deep meaning in culture, as follows:

> "Play is older than culture, for culture, however inadequately always presupposes human and animals have not waited for man to teach them their playing. We can safely assert, even, that human civilization has added no essential feature to the general idea of play. Animals play just like men. We have only to watch young to see that all the essentials of human play are present in their merry gambols. They invite one another to play by a certain ceremoniousness of attitude and gesture. Keep to the rule that you shall not bite, or not bite hard, your brother's ear. They pretend to terribly angry. And-what is most important-in all these doings they plainly experience tremendous fun and enjoyment. Such rompings of young dogs are only one of the simpler forms of animal play. There are other, much more highly developed forms: regular contests and beautiful performances before an admiring public.
>
> …In play there is something" at play" which transcends the immediate needs of life and imparts meaning to the action. All play means something. If we call the active principle that makes up the essence of "instinct," we explain nothing; if we call it "mind" or "will" we say too much. However we may regard it, the very fact that play has a meaning a non-materialistic quality in the nature of the thing itself."[5]

And for the rest us: enjoy the show….

Allow me to end this rambling remark with a popular song "Under the sea," to capture the fun on living at the bottom of the sea…and begin to live each moment of your life. Just as Ecclesiastes advised:

"And also that every man should eat and drink, and enjoy the good of all his labour, it is the gift of God." (Eccl. 3:13)

Under the Sea
Samuel E. Wright

The seaweed is always greener
In somebody else's lake
You dream about going up there
But that is a big mistake
Just look at the world around you
Right here on the ocean floor
Such wonderful things surround you
What more is you lookin' for?
Under the sea
Under the sea
Darling it's better
Down where it's wetter
Take it from me
Up on the shore they work all day

Out in the sun they slave away
While we devotin'
Full time to floatin'
Under the sea
Down here all the fish is happy
As off through the waves they roll
The fish on the land ain't happy
They sad 'cause they in their bowl
But fish in the bowl is lucky
They in for a worser fate
One day when the boss get hungry
Guess who's gon' be on the plate?
Under the sea
Under the sea
Nobody beat us
Fry us and eat us
In fricassee
We what the land folks loves to cook
Under the sea we off the hook
We got no troubles
Life is the bubbles
Under the sea (Under the sea)
Under the sea (Under the sea)
Since life is sweet here
We got the beat here
Naturally (Naturally)
Even the sturgeon an' the ray
They get the urge 'n' start to play
We got the spirit
You got to hear it
Under the sea
The newt play the flute
The carp play the harp
The plaice play the bass
And they soundin' sharp
The bass play the brass
The chub play the tub
The fluke is the duke of soul
(Yeah)
The ray he can play
The lings on the strings
The trout rockin' out
The blackfish she sings
The smelt and the sprat
They know where it's at
An' oh that blowfish blow

Yeah, under the sea (Under the sea)
Under the sea (Under the sea)
When the sardine
Begin the beguine
It's music to me (It's music to me)
What do they got? A lot of sand
We got a hot crustacean band
Each little clam here
Know how to jam here
Under the sea
Each little slug here
Cuttin' a rug here
Under the sea
Each little snail here
Know how to wail here
That's why it's hotter
Under the water
Ya we in luck here
Down in the muck here
Under the sea

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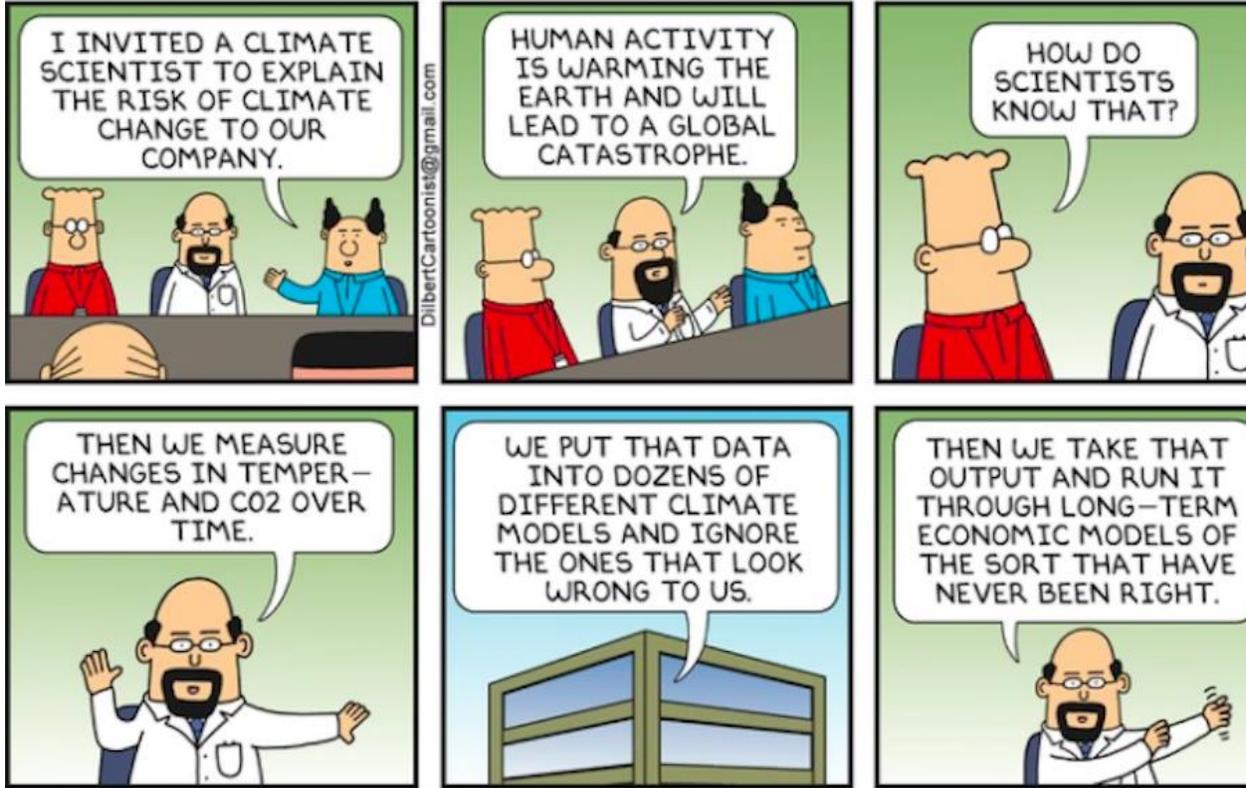
DILBERT

A glimpse into 5 fundamental problems in economics theorizing, and their possible resolution

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Abstract

In this article we will review shortly five fundamental problems in economics theorizing, at least from our view as scientists/physicists, namely: the law of diminishing return, rational decision making, the law of utility maximization, binary/dialectical clashes, and all people are basically selfish. Hopefully readers will find this discussion at least entertaining, if not stimulating. Interested readers may wish to read an older paper by Vernon Smith [14]. This article continues our previous article in ICRIEECE, last august 2018.

Quote: "There are two kinds of people in the world: Those who make things complicated, and those who make things simple."[62]

Introduction

From time to time, a number of economists have argued on the necessity to reconsidering philosophical foundations of economics theorizing, to name a few: David Korten and E.F. Schumacher [15][16]. Those people speak for specialists in their discipline. Now allow us to rephrase such an intense philosophical debate in a rather simple and more accessible language, as far as we can see on the fundamental problems of economics theorizing.

Let us begin with a few one-liner jokes.

There is kind of good motivation for people on the streets to make various jokes on those economists, may be out of frustration because economists often talk in alien language which nobody can understand. One that many like most is this one from Disraeli: *"There are three kinds of lie: lies, damn lies and*

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[62] http://philippe.ameline.free.fr/humor/TwoKindOfPeople.htm

statistics." A clever page at University of New York attributed this quote to Lord Courtney, 1895. But it may come from older source, as follows:

a. A query in *Notes and Queries* (7th Ser. xii) (1891 Oct. 10), p. 288, reads as follows:

   DEGREES OF FALSEHOOD. – Who was it who said, "There are three degrees of falsehood: the first is a fib, the second is a lie, and then come statistics"? - ST. SWITHIN[63]

b. on Wednesday 20 August 1895, the same attribution can be found in an Editorial in the *New York Times* which begins as follows:–

"OFFICIAL STATISTICS"

According to a saying credited to Lord Beaconsfield, there are three kinds of mendacity—lies, blank lies, and statistics. This means, doubtless, that nobody with a cause to maintain it ever lacked figures with which to do it. Even the anti-vaccinationists, for instance, by searching the inspiring tables of mortality in various countries, and especially by calling upon their own fervid imaginations, find no difficulty in proving that Jenner was a fiend in not too human form, and that a man vaccinated is for all practical purposes a man dead.

The attribution to Disraeli became more widely known because of the passage in *Mark Twain's Autobiography* quoted below under Twain, Mark. [64]

A more modern version of such anecdotal quote sounds like this:

> "There are **two things you** are better off **not** watching **in the making**: sausages and econometric estimates."[65]

While we can continue such an old joke, what we intend to reveal in this article is meager in nature; we want to discuss 5 fundamental problems in economics theorizing that we should keep in mind. We don't pretend to write a whole textbook based on these problems, suffice it to say, that these could be an impetus to move forward.

1. The law of diminishing return

This is just like what Malcolm Gladwell reveals in one of his books: i.e. many things in our real life take an inverted-U-shape.[66] For example, some of you

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[63] https://www.york.ac.uk/depts/maths/histstat/lies.htm
[64] https://www.york.ac.uk/depts/maths/histstat/lies.htm
[65] The original JokEc compiled by Pasi Kuoppamäki in Finland, url: http://economicscience.net/content/JokEc/
[66] See also Appendix I for other example of U-shape pattern.

may think that the *law of diminishing return* only holds true for consumable goods, but it does not hold for money.

Let say, you drink a glass of cold beer in a hot day, and you find it nice. Then you drink the second glass, and third glass, then at a point you say to yourself *"It is enough for me."*[67] The question is: economics textbooks say that law of diminishing return seems not hold for money, right? How much money do you need to say "enough for me"? May be some readers will find "enough" at the moment he/she got a few thousand dollars, others may find enough when he/she wins a jackpot of few million dollars, while others may find the enough point somewhat higher.[68] But what do you find after certain critical point? Chance is you will not find more happiness anymore at the same rate as before. That is called inverted-U-shape rule. Just like the old tale about Midas: when the king found anything he touches become gold, initially he was happy, but he found –only too late to save the day — that if everything turns into metallic gold, that would be disaster.

So, again let us emphasize that apparently in this real world, there is inverted-U-shape behavior for anything that we try endlessly to collect and possess. Finding out the optimal limit is the true key of happiness in life; a careful wisdom saying as follows:

"**7** <u>Two</u> things have I <u>required</u> of thee; <u>deny</u> me them not before I <u>die</u>: **8** Remove <u>far</u> from me <u>vanity</u> and <u>lies*</u>: <u>give</u> me neither <u>poverty</u> nor <u>riches;</u> <u>feed</u> me with <u>food</u> <u>convenient</u> for me: **9** Lest I be <u>full</u>, and <u>deny</u> thee, and <u>say</u>, Who is the <u>LORD?</u> or lest I be <u>poor</u>, and <u>steal</u>, and <u>take</u> the <u>name</u> of my <u>God</u> in vain." (Proverbs 30:7-9, KJV)[69]

2. rational decision making

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[67] When you go to the bar the next time, may be you can get a discount for beers by impressing the bartender. Try to say this: "I just want to test the law of diminishing return, may I get special discount for beers?"

[68] This author tends to think that "*enough*" is a concept when economics theory breaks down, and this issue becomes spiritual and philosophical. It requires you to define yourself and your value system: a utility-maximiser or a happiness-maximiser.

[69] https://www.biblestudytools.com/kjv/proverbs/30-9.html

Another basic tenet in economics thinking is belief that human decides on rational decision making.

According to a paper sent to us by a colleague:

> "In philosophy, Boudon refined the model taken from the economic world of the rational actor. According to the economist Becker, awarded the Nobel Prize for this paradigm, rationality would first of all be in action: what a person does would be the result of a rational calculation of benefits versus costs among the possible solutions. Thus, by his reflection a person chooses the action which carries out for him the maximum of advantages for the minimum of costs (disadvantages). It is a variant of the popular law of the least effort, which perhaps however comes closer to reality.
>
> Boudon extends the rationality of a purely economic level to various aspects including those emotional, and among them those that are in fact social. The expected benefit of an action can also be immaterial: for example, emotional or symbolic. Finally, the reason for rationality can be supplemented by what the actor considers to be good reasons for him: valid reasons in his eyes."[70]

While this remark is interesting, we can ask: when one considers emotion value before making buying decision, yes we can say he/she still does rational choice. But may be not. May be he/she decides on intuitive level, that is way marketers know that most of the time, it is much better to put attractive goods at queue line in supermarket casher. They call it: "*impulsive buying*."

So, it is appreciated that economists now consider deeper psychological aspects in decision making (see Daniel Kahnemann, Amos Tversky works etc.)

3. the law of utility maximization

Another basic tenet is known as "utility maximization" principle. But let us ask: maximize for whom, and to what time frame? Answering these questions will avoid too many problems in defining what to be maximized.

It is prescribed in economics textbooks that people wants to maximize their utility, and Equilibrium is described as the result of maximizing utility U subject to budget constraint. But the definition of the utility U as a measurable quantity remains not conclusive in literature, see for example discussion by McCauley [9].

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[70] Quote from S. Broumi et al. *Thinking on Thinking: The Elementary forms of Mental Life Neutrosophical representation as enabling cognitive heuristics*. Submitted for review

We consider that it is very essential to base economics theory on measurable quantity from the beginning, because optimization at individual and aggregate levels is the very hallmark of modern economics theory (Tubaro, 2006, p.1 [10]). That measurable quantity can be observed by virtue of experiment or field observation.

There are extensive literatures on this subject, ranging from mathematical analysis, historical study, to philosophical consideration, but here we limit our review to a few definitions on utility U, highlighting some basic thoughts in modern economics literatures.

It is normally prescribed in economics textbooks that people wants to maximize their utility, in other words Wealth is often defined as a function of maximizing utility; and therefore Equilibrium is described as the result of maximizing the utility U subject to budget constraint [9]. But the definition of the utility U as a measurable quantity remains not conclusive as described by McCauley [9]. In fact, econometrics is based on the non-empiric notion of utility [10, p.1]. Furthermore, utility maximization was not clearly related to actual individual achievement; indeed it is merely a normative prescription (i.e. something that people should somehow learn to or conform to), rather than as a possible interpretation of the observed behavior of individuals (Tubaro, 2006, p.5 [10]). We think that part of the problem comes from this fact: defining utility and happiness is a delicate issue. When somebody asks "what time is it?," he is ordinary people, but when he/she asks: "What is time?," then he/she is a philosopher. Similarly, if somebody asks "let us maximize utility for this year," perhaps he/she is a CEO/economist. But if he/she asks: "But wait, what is utility? What is happiness?," then he/she is a philosopher.

But these issues on Bentham, Mills etc, are reserved for other paper.

4. Binary/dialectical clashes

Binary choices are another source of problems. As a one-liner joke says:

There are two kinds of people in the world: Those who think there are two kinds of people in the world and those who don't. (Plus some others who aren't sure.) [71]

A funnier joke on binary logic:

There are 10 kinds of people in the world: Those who understand binary and those who don't.[72]

As Broumi et al remarked:

"These two possibilities, these alternatives, are the basis of cognition, and allow choice and therefore action through the fact that a preference becomes possible: either I prefer there is X, or I prefer there is no X. Then autonomy appears. And indeed the valuation or affect too: "I like" or "I don't like", and it goes with it together.

The stages described here are not as distinct as those of Piaget, they overlap, include and extend. The "there is no" is opposed to the "there is" forming the opposite. Thus the binary appears and the logic of the same name also: either "there is", or "there is not": X or non-X, one and the other being mutually exclusive.

…There is this and that and that again: a perception of the environment, a representation of a situation as a collection of objects. Our other most frequent and fundamental conception is opposition: there is or there is not. What also gives one thing and its opposite: day and night, hot and cold, big and small ... The importance of this simplifying binary conception of two situations sliced diametrically away in opposite is the most prominent form of mental life. It is the emblematic *form of a choice.*"[73]

In this regards, One of us (FS) recently published a new book, with title: *Neutropsychic personality.*[13] In this book, FS described possible extension of Freudian mental model: *id-ego-superego,* using his Neutrosophic Logic theory. His definition of Neutropsychic is as follows:

"Neutropsyche is the psychological theory that studies the soul or spirit using the neutrosophy and neutrosohic theories. It is based on triadic neutrosophic psychological concepts, procedures, ideas, and theories of the form (<A>, <neutA>, <antiA>), such as (positive, neutral, negative), (good behavior, ignorant behavior, bad behavior), (taking the decision to act, pending, taking the decision not to act), (sensitive, moderate, insensitive), (under-reacting, normally reacting, over-reacting), (under-thinking, normal thinking, over-thinking), and so on, and their refinements as (<Aj>, <neutAj>, <antiAj>)." [13, p.29]

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[71] http://philippe.ameline.free.fr/humor/TwoKindOfPeople.htm

[72] http://philippe.ameline.free.fr/humor/TwoKindOfPeople.htm

[73] Quote from S. Broumi et al. *Thinking on Thinking: The Elementary forms of Mental Life Neutrosophical representation as enabling cognitive heuristics.* Submitted for review

Perhaps it would be necessary to develop an improved model of neutropsychic basis of decision making process.

Another possible way of resolution of this fundamental problem of human societies, is to accept the otherness, without being absorbed that otherness. In other words, we should try to find common trust, where people can do dialogue and do peaceful co-existence. While this notion of peaceful co-existence belong to social psychology, we can also think of them starting from the known terms in particle physics: *boson and fermion.*

Yes, normally you read numerous political-economics jargons, e.g. leftist, right wing, centrist left or centrist right and so on.

But it is not our intention to submit another ideological *parlance*. In fact, these authors are scientist and mathematician, so we are not so inclined to any parlance.

In our opinion, our tendency to cooperate or compete is partly influenced by the culture that we inherit from our ancestors. One of us (VC) once lived for a while in Russia, and he found that many people there are rather cold and distant (of course not all of them, some are friendly). He learned that such a trait is quite common in many countries in Europe. They tend to be individual and keep a distant to each other. In physics term, they are like *fermions.*[74]

There is a developmental psychology hypothesis that suggests that perhaps such a trait correlates to the fact that many children in Europe lack nurtures and human touch from their parents, which make them rather cold and individual. Of course, whether this is true correlation, it should be verified.

On the contrary, most people in Asia are gregariously groupie (except perhaps in some big metropolitans). They tend to spend much time with family and friends,

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[74] While our proposed simplifying analogy of human behaviour, i.e. individualism and collectivism sound not so common. Indeed such cultural psychology research has been reported since Harry C. Triandis et al. See for example: (a) The Self and Social Behavior in Differing Cultural Contexts, Psychological Review, vol. 96 no. 3; (b) Harry C. Triandis and Eunkook M. Suh, CULTURAL INFLUENCES ON PERSONALITY, Annu. Rev. Psychol. 2002. 53:133–60; (c) J. Allik & A. Realo, Individualism-collectivism and social capital, JOURNAL OF CROSS-CULTURAL PSYCHOLOGY, Vol. 35 No. 1, January 2004, 29-49. This last mentioned paper includes a quote from Emile Durkheim: "The question that has been the starting point for our study has been that of the connection between the individual personality and social solidarity. How does it come about that the individual, whilst becoming more autonomous, depends ever more closely upon society? How can he become at the same time more of an individual and yet more linked to society?"

just like many Italians. They attend religious rituals regularly, and so on. In physics term, they are *bosons*. Of course, this sweeping generalization may be oversimplifying.[75]

Therefore, it seems quite natural to us, why Adam Smith wrote a philosophy book suggesting that individual achievement is a key to national welfare (because he was a British which emphasized individualism).[76] It took more than hundred years until mathematicians like John F. Nash, Jr. figured it out that individual pursuit towards their own goals will not lead them to achieve a common goal as society.[77]

That is why, we choose to work out Mancur Olson's theorem, because he is able to condense the complicated game theoretical reasoning (whether one should cooperate or not) into a matter of collective actions.

So, which is better: *to be like fermions or bosons?* Our opinion is: just like in particle physics, both fermions and bosons are required. In the same way, fermion behavior and boson behavior are both needed to advance the quality of life. Fermion people tend to strive toward human progress, while boson people are those who make us alive. Just like an old song: Ebony and Ivory....they make harmony in society.

We hope this paper help us to see that collective actions are what made us a human society.[78] And it seems related to *social innovations* and also social *capital* too, in other words a society with social capital and collective actions

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[75] After writing up this article, we found that Sergey Rashkovskiy also wrote a quite similar theme, albeit with a statistical mechanics in mind. The title of his recent paper is: "'Bosons' and 'fermions' in social and economic systems." Here is abstract from his paper: "We analyze social and economic systems with a hierarchical structure and show that for such systems, it is possible to construct thermostatistics, based on the intermediate Gentile statistics. We show that in social and economic hierarchical systems there are elements that obey the Fermi-Dirac statistics and can be called fermions, as well as elements that are approximately subject to Bose-Einstein statistics and can be called bosons. We derive the first and second laws of thermodynamics for the considered economic system and show that such concepts as temperature, pressure and financial potential (which is an analogue of the chemical potential in thermodynamics) that characterize the state of the economic system as a whole, can be introduced for economic systems." Url: https://arxiv.org/ftp/arxiv/papers/1805/1805.05327.pdf

[76] If only Adam Smith was born in Bangkok or Manila, probably he wrote his book in a different way.

[77] Imagine 10 players of a football team go simultaneously to make a goal to their opposite team, will they succeed? Of course no, they should arrange according to their coach's instruction: 1-4-4-2, or other type of arrangement.

[78] In our country, there is a specific word for some people who work together to achieve a common goal: "*gotong royong.*"

will ensure its sustainable future.[79] But this is beyond the scope of this sort paper.

5. All people are basically selfish.

Yes, we all have heard about term advocated by Dawkins: "the selfish genes." It seems true that people are mostly selfish. But let us ask, is it true?

To put this more bluntly, in fact some of us on top of the ladder of society have inclination to be a psychopath. Let us quote an interesting article by Lindsay Dodgson:

> In the Diagnostic and Statistical Manual of Mental Disorders, or DSM-5, antisocial or psychopathic personality types are defined as having an inflated, grandiose sense of themselves, and a habit of taking advantage of other people. However, it's still a hard disorder to define, as most of us have some psychopathic traits. In fact, some psychologists believe everyone falls on the psychopathy spectrum somewhere.
>
> On their own, some traits are beneficial to us, such as keeping a cool head, and having charisma. This is why many psychopaths become CEOs, because they can look at the cold, hard facts and make decisions without becoming emotionally involved.
>
> Still, a number of researchers have attempted to find a way of diagnosing psychopathic behavior. One well-known test for psychopaths is the "*The Hare Psychopathy Checklist*," which analyses how you see yourself and other people.
>
> The team from Columbia Business School and Cornell Universities gave participants a set of moral dilemmas, and also asked them to complete three personality tests: one for assessing psychopathic traits, one assessing Machiavellian traits, and one assessing whether they believed life was meaningful.
> **This was one of the questions they were asked:**
>
>> *"A runaway trolley is about to run over and kill five people and you are standing on a footbridge next to a large stranger; your body is too light to stop the train, but if you push the stranger onto the tracks, killing him, you will save the five people. Would you push the man?"*
>
> The team found that those who answered the dilemmas with an "ethic of utilitarianism" — the view which says the morally right action is whichever one produces the best consequence overall — possessed more psychopathic and Machiavellian personality traits. In the above question, if you'd choose to push the man, you have more in common with the people who had psychopathic or Machiavellian traits.
>
> This makes sense when you think about how Machiavelli generally believed *"the ends justifies the means*," and that killing innocent people could be normal and effective in politics, as long as the outcome was for the greater good.[11]

This article seems convince us that we need to become aware on our own tendency of being a psychopath. Moreover, it takes honesty to admit that we are prone to be selfish person…then we can work out to be a better person.

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[79] Emily Ouma & Awudu Abdulai. Contributions of Social Capital Theory in Predicting Collective Action Behavior among Livestock Keeping Communities in Kenya. url:
https://ageconsearch.umn.edu/bitstream/49994/2/Manuscript%20No.%20423_Social%20capital%20theory%20and%20collective%20action.pdf

At this point, readers may ask: what can we do? It seems all people around me look selfish, they even call it "a norm."

Allow us to submit two possible ways we can remedy this horrible situation:

a. Solving Mancur Olson's collective action problem [12]

Instead of being just another selfish gene, you can try to solve Mancur Olson's problem: "*how your group can do collective action at large scale, while the benefits are not so tangible for everyone*" (4). Our hypothesis is: Olson's collective action problem only applies to unconnected society. In a heavily connected society like ours now, we can figure out how to solve this Olson's dilemma, and doing some meaningful collective actions in the internet.[80] For example: there are some initiatives of online crowdfunding, crowdsourcing, and online cooperatives.[81] So, actually you can start to do something good to your community even with a small amount of fund, provided you plan properly and do it collectively. In a previous paper at ICRIEECE, we argue in favor of Superconductive Olson's theorem.[1]

b. Working out new ways to manage people in order to pull out the goodness from them.

Let us remind the readers on some basic of management views. It is known for quite long time, that in management, managers with such a typical desire to control everyone else are called Type-X managers.[82] But we know that there are other types of management:

- Type Y[83]

- Type Z (William Ouchi)[84]

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[80] An outline of reasoning to support this hypothesis can be found in [1], albeit it is not so sophisticated.

[81] For example: www.startsomegood.com

[82] https://www.inplantgraphics.com/article/are-you-theory-x-theory-y-leader/

[83] http://hrmars.com/admin/pics/1922.pdf

[84] https://studiousguy.com/william-ouchis-theory-z-of-leadership/

Now, speaking in terms of technologies, we can put these facts into categories as follow:

e. Type X technologies
f. Type Y technologies
g. Type Z technologies

In other words, this author believes that technologies should be designed from the start: to control and exert hegemony, or to humanize. But some readers may argue: *but isn't technology neutral, just like a knife can be used for cooking food or to harm people?* Yes, some technologies are neutral from ethical premises, but most of them has a special purpose in mind. Let say, when a chemical scientist begins research in sarin gas, does he/she has some kind of evil mind in plan? Of course.

Some other readers may ask: is it possible to devise technologies to humanize and promote good side of human being? Absolutely yes.

Prof. Adam Grant in his book: *Give and Take* made a good point while comparing Craiglist and Freecycle. While these two network are popular, there is difference between them: Craiglist promotes matching behavior, while Freecycle promotes giving behavior. The good news is that Adam Grant found that through Freecycle, users find themselves truly motivated into giving behavior, even if initially they have more taker and matcher behavior.[28][29] In other words, certain choice of technologies can move the users to exercise their goodness and giving behavior (altruistic and humanistic side), and other choice can promote users to become more selfish and taker.[85]

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[85] In the meantime we admit that corporate leaders (CEO) who want to promote more altruistic and giving behaviour often will face resistance from board of shareholders etc., partly because of various pressures exerted to them from internal and external sources. This author read somewhere that CEOs in USA were pressed day by day to keep their stockprice high; and failure to keep that market value can result in termination. At the opposite side, some writers argue that most Japanese CEOs seem to not being pressed by shareholders to keep high in daily results. In other words, USA companies are more "*short-term result oriented*", while Japanese companies are more "*long term goal oriented*." There are some interested references of such cultural differences, see for instance: http://clearlycultural.com/geert-hofstede-cultural-dimensions/long-term-orientation/; http://japanwatching.com/culture/92-how-different-are-the-japanese

Before ending this paper, allow me to push the boundary of our management thinking by submitting a fourth type of technology style:

h. Type D technologies. What I mean with D technologies is technologies who stop to see human being (users) as "IT", but begin to see them as "THOU" (subject). The "D" letter is named after "dialogue", a human virtue promoted by Martin Buber, a famous existential philosopher with his book: *I and Thou*. While Buber's thinking has been known for long time in psychotherapy etc., there is deficiency in thinking in terms of dialogic-management style. However, there are some works who consider dialogic-relational leadership (sometimes called *Nordic style*). Therefore, we think there is still hope that we can turn such a dialogic-relational leadership into a new type of technologies approach, beyond "*controlling them all*" management style of 1930s. In other words, perhaps the essence of problem with *techno-corporatocracy* is their *assumption on humanity* is caught in early 20th century, which is not compatible anymore with the value system of younger generations in this 21st century. See [30-34]

At this point, some readers may ask: how can we put such a dialogic-leadership along with Type D technologies into practice?

Yes, that question is quite difficult to answer, especially considering that e-commerce and all sorts of hegemonic practices which predominating the Internet nowadays.

But it is not all the story. If we return to the early days of the WWW, its inventor Tim Berners-Lee did have a more egalitarian and noble motives in mind:

"Tim Berners-Lee and his colleagues faced a number of tough challenges when inventing the web, including having to build early browsers and protocols from scratch and overcoming initial scepticism (his original idea was labelled 'vague but exciting' by his boss at CERN). The nascent web also needed to be brought into being under the radar, and the terms for the release of its code carefully formulated to guarantee its free availability for all time. It took 18 months to persuade CERN that this was the right course. "*Had the technology been proprietary, and in my total control, it would probably not have taken off*. The decision to make the web an open system was

necessary for it to be universal. You can't propose that something be a universal space and at the same time keep control of it," said Berners-Lee in 1998."[86]

Therefore, it is not an overstatement to say that the WWW has been designed to be *decentralized* network, though over the course of time, it turned out to be centralized.

But that is not the end of the story, Tim Berners-Lee and his team from MIT nowadays work out a plan to reclaim his invention to be more in tune with his initial invention. They build a new startup called "*Inrupt*" with a new kind of decentralized platform: **Solid**.[87]

Concluding remarks

In this short article we review five fundamental problems in economics theorizing. Hopefully readers will find these discussions interesting, if not stimulating.

Interested readers may wish to read an older paper by Vernon Smith [14].

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Appendix

Another example of U-shape pattern (albeit not so perfect), esp. in historiography of economy.

On the Efficacy of High-dose Vitamin C as Anticancer Treatment: A Literature Survey

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Abstract

Vitamin C (ascorbic acid, ascorbate) has a controversial history in cancer treatment. Emerging evidence indicates that ascorbate in cancer treatment deserves re-examination. As research results concerning ascorbate pharmacokinetics and its mechanisms of action against tumor cells have been published, and as evidence from case studies has continued to mount that ascorbate therapy could be effective if the right protocols were used, interest among physicians and scientists has increased.

Key Words: vitamin C, antioxidant, anticancer

1. Introduction

Ascorbic acid (vitamin C, ascorbate) has been shown to protect cells against various types of oxidant injury at physiologically relevant concentrations. Vitamin C has been suggested as having both a preventative and therapeutic role in a number of pathologies when administered at much higher-than-recommended dietary allowance levels.

Despite some initial skepticism on the use and efficacy of high-dose Vitamin C as anticancer treatment, some recent findings seem to support such a practice. Here we will survey some recent literatures around this controversial topic. There is even one book devoted to the use of Vitamin C for anticancer.[2]

Vitamin C (ascorbic acid, ascorbate) has been well documented to reduce the incidence of most malignancies in humans. What has been hotly debated is

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whether vitamin C has any therapeutic effect in the treatment of cancer. Cameron and Pauling reported in 1976 and 1978 that highdose vitamin C (typically 10 g/day, by intravenous infusion for about 10 days and orally thereafter) increased the average survival of advanced cancer patients and for a small group of responders, survival was increased to up to 20 times longer than that of controls.[1]

According to Cameron and Pauling, results of the use of Vitamin C to extend live of patients are encouraging. See table 1 below.

TABLE 1
Differences in Average Survival Times of Ascorbate-Treated Patients and Matched Controls

Primary Tumor Type	Number of Patients		Mean survival times (days)				Increased survival times of ascorbate-treated patients (days)		
			Measured from date of first hospital attendance		Measured from date of "untreatability"				
	Test	Controls	Test (A)	Control (B)	Test (C)	Control (D)	A-B (E)	C-D (F)	G
Colon	17	170	458+	316	352+	33	142+	319+	324+
Bronchus	17	170	219+	118	186+	31	101+	155+	184+
Stomach	13	130	286+	159	182+	32	127+	150+	134+
Breast	11	110	1396+	1020	487+	52	376+	435+	378+
Kidney	8	80	774+	492	381+	39	282+	342+	348+
Bladder	7	70	1669+	420	355+	21	1249+	334+	226+
Rectum	7	70	634	336	270	43	298	227	247+
Ovary	6	60	884	366	183	69	518	114	157+
Others	14	140	706+	279	278+	37	427+	241+	189+
All	100	1000	681+	360	293+	38	321+	255+	234+

A. Mean survival time for ascorbate-treated patients measured from date of first hospital attendance. B. Corresponding time for controls. C. Mean survival time for ascorbate-treated patients measured from date of "untreatability." D. Corresponding time for controls. E. Additional survival time of ascorbate-treated patients, A-B. F. Additional survival time of ascorbate-treated patients, C-D. G. Additional survival time of first set of ascorbate-treated patients with first set of controls, ref. 1, to May 15, 1978, when seven were still living (measured from the date of "untreatability").

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Table 1. Differences of Average Survival Times of Ascorbate-treated Patients
(after Cameron & Pauling [1])

Other researchers reported benefit consisting of increased survival, improved well-being and reduced pain. However, two randomized clinical trials with oral ascorbate conducted by the Mayo Clinic showed no benefit. These negative results dampened, but did not permanently extinguish, interest in ascorbate therapy or research. Some research groups conducted rigorous research,

particularly in the area of administering mega-doses of ascorbate intravenously.[3]

History

A more complete historical account of Vitamin C can be found in Gonzalez & Miranda-Massari [2].

Such an early development around 60s and 70s have been supported by later findings, therefore the use of highdose Vitamin C for anticancer purpose has become more or less accepted. But the remaining question is: what are the exact mechanism of Vitamin C as anticancer agent?

Pharmacokinetics

According to Mikirova et al.:

> "Vitamin C is water-soluble, and is limited in how well it can be absorbed when given orally. While ascorbate tends to accumulate in adrenal glands, the brain, and in some white blood cell types, plasma levels stay relatively low. According to the study, the plasma levels in healthy adults stayed below 100 µM, even if 2.5 grams were taken when administered once daily by the oral route.
>
> Cancer patients tend to be depleted of vitamin C: fourteen out of twenty-two terminal cancer patients in our phase I study were depleted of vitamin C, with ten of those having zero detectable ascorbate in their plasma. In a study of cancer patients in hospice care, thirty percent of the subjects were deficient in vitamin C. Deficiency (below 10 µM) was correlated with elevated inflammation marker C-reactive protein (CRP) and shorter survival times. Given the role of vitamin C in collagen production, immune system functioning, and antioxidant protection, it is not surprising that subjects depleted of ascorbate would fare poorly in mounting defenses against cancer. This also suggests that supplementation to replenish vitamin C stores might serve as adjunctive therapy for these patients."[5]

While generally speaking, such use of highdose of Vitamin C is considered harmless, there are potential side effects as reported by Unlu et al. [6].

Possible mechanism

We shall emphasize here that many mechanisms of action for ascorbate efficacy against cancer have been proposed over the years. Cancer patients are often deficient in vitamin C, and require large doses to replenish depleted stores. It has been demonstrated in vitro and in animal studies that vitamin C is preferentially toxic to tumor cells at millimolar concentrations; moreover,

pharmacokinetic data suggest that these concentrations are clinically achievable when ascorbate is administered intravenously. Data suggests that ascorbate may serve as a biological response modifier, affecting inflammation and angiogenesis as well as improving immune function parameters.[5]

More descriptions of mechanism of Vitamin C as anticancer agent can be found in Gonzalez & Miranda-Massari [2].

Frei and Lawson also add some interesting fact that Vitamin C is able to kill cancer cells without harming normal cells. They wrote:[7]

> "Why is it important to understand how vitamin C can produce H_2O_2 and kill cancer cells but not normal cells? Because without this detailed knowledge, we do not have a scientific rationale to revisit the question of whether i.v. infusion of vitamin C may have value in treating cancer patients. The potential cancer-therapeutic activity of vitamin C has a long and controversial history. In 1973, Linus Pauling and Ewan Cameron postulated that vitamin C inhibits tumor growth by enhancing immune response and stabilizing glycosaminoglycans of the extracellular matrix by inhibiting hyaluronidase. Cameron and Campbell reported on the response of 50 consecutive patients with advanced cancer to continuous i.v. infusions (5–45 g/d) and/or oral doses (5–20 g/d) of vitamin C. No or minimal response was observed in 27 patients; 19 patients exhibited tumor retardation, cytostasis, or regression; and 4 patients experienced tumor hemorrhage and necrosis. The first clinical study by Cameron and Paulingcompared survival times between 100 patients with terminal cancer treated with i.v. and oral vitamin C, usually 10 g/d, and 1,000 comparable patients not given vitamin C. Patients treated with vitamin C survived approximately four times longer than controls, with a high degree of statistical significance (P 0.0001). A follow-up study reported that patients given vitamin C had a mean survival time almost 1 year longer than matched controls. Overall, 22% of vitamin C-treated patients but only 0.4% of controls survived for more than 1 year."

Chemotherapy Controversy

With regards to possible interaction with chemotherapy, Mikirova et al. have reported:

> "The observations that ascorbate is an antioxidant and that it preferentially accumulates in tumors have raised fears that ascorbate supplementation would compromise the efficacy of chemotherapy. In support of this, Heaney and coworkers found that tumor cells in vitro and xenografts in mice were more resistant to a variety of anticancer agents when the tumor cells were pretreated with dehydroascorbic acid. Questions have been raised, however, whether the experimental conditions used in this study are clinically or biochemically relevant, considering, among other issues, that dehydroascorbic acid rather than ascorbic acid was used [45]. A variety of laboratory studies suggest that, at high concentrations, ascorbate does not interfere with chemotherapy or irradiation and may enhance efficacy in some situations. This is supported by meta-analyses of clinical studies involving cancer and vitamins; these studies conclude that antioxidant supplementation does not interfere with the toxicity of chemotherapeutic regiments."[5]

Concluding remarks

We have discussed some real positive effects on the use and efficacy of Vitamin C as anticancer treatment.

To conclude this short review, allow us to quote Cameron & Pauling:

> "There is good evidence that high intakes of ascorbate potentiate the immune system in various ways: increasing the production and effectiveness of antibodies and crucial components of the complement cascade, enhancing lymphocyte blastogenesis, stimulating macrophage chemotaxis, improving phagocytic ability, amplifying lymphocyte trapping, and increasing the proliferation and differentiation of antigen-triggered lymphocytes.
> Ascorbate offers some protection against oncogenic viruses and against a variety of known chemical and physical carcinogens, and is also involved in a number of biological processes, discussed in this review, that are known to contribute to host resistance to neoplastic disease. There is a growing suspicion that "host resistance to cancer," no matter how measured, is largely dependent upon the dietary intake of this simple nutrient."[1]

Nonetheless, further studies and procedures to maximize such positive impact of Vitamin C as anticancer should be continued.

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Chapter 14

On the Efficacy of Moringa Oleifera as Anticancer Treatment:
A Literature Survey

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Abstract

Medicinal plants are important elements of indigenous medical system that have persisted in developing countries. Many of the botanical chemo-preventions currently used as potent anticancer agents. However, some important anticancer agents are still extracted from plants because they cannot be synthesized chemically on a commercial scale due to their complex structures that often contain several chiral centers. The aim of this study was to test different extracts from the Moringa oleifera leaves. Previous studies have shown potentially antioxidant, antitumor promoter, anticlastogen and anticarcinogen activities both in vitro and in vivo. Emerging evidence indicates that efficacy of Moringa oleifera in cancer treatment deserves re-examination. This paper is a short literature survey of research in recent years.

Key Words: moringa oleifera, antioxidant, anticancer

Introduction

Moringa Oleifera[88] (MO), a plant from the family Moringacea is a major crop in Asia and Africa (they can be found in Himalaya mountain, and have been used for thousand years in India etc.). MO has been studied for its health properties, attributed to the numerous bioactive components, including vitamins, phenolic acids, flavonoids, isothiocyanates, tannins and saponins, which are present in significant amounts in various components of the plant. Moringa Oleifera leaves are the most widely studied and they have shown to be beneficial in several

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  [88] Moringa Oleifera leave is also known as "daun kelor" by Indonesians.

chronic conditions, including hypercholesterolemia, high blood pressure, diabetes, insulin resistance, non-alcoholic liver disease, cancer and overall inflammation.

Meanwhile, it is known that cancers are the leading causes of morbidity and mortality worldwide, with approximately 14 million new cases and 8.2 million cancer related deaths. The number of new cases is expected to rise by about 70% over the next 2 decades. Among men, the 5 most common sites of cancer diagnosed were lung, prostate, colorectum, stomach, and liver cancer. Among women the 5 most common sites diagnosed were breast, colorectum, lung, cervix, and stomach cancer.[7]

This paper is a short literature survey of research on MO efficacy as anticancer treatment in recent years.

Identification

According to Hassan et al. [4]:

> "Moringa is a small, fast-growing, drought deciduous tree or shrub that reaches 12 m in height at maturity. It has a wideopen, typically umbrella- shaped crown, straight trunk (10-30 cm thick) and a corky, whitish bark. The plant (depending on climate) has leaflets 1-2 cm in diameter and 1.5-2.5 cm in length its leaves are impair pinnate ,rachis 3 to 6 cm long with 2 to 6 pairs of pinnules. Each pinnule has 3 to 5 obovate leaflets that are 1 to 2 cm long (Von Maydell, 1986). The terminal leaflet is often slightly larger. Its leaflets are quite pale when young, but become richer in color with maturity. Cream-colored flowers emerge in sweet-smelling panicles during periods of drought or water stress when the tree loses its leaves. The pods are triangular in cross-section-30 to 50 cm long and legume-like in appearance. The oily seeds are black and winged. . The tree produces a tuberous taproot, which explains its tolerance to drought conditions (F/FRED, 1992)."

Occurrence throughout the world

According to Leone et al. [5]:

> "This species is a fast growing soft wood tree that can reach 12 m in height and is indigenous to the Himalayan foothills (northern India Pakistan and Nepal) [2,3]. Its multiple uses and potential attracted the attention of farmers and researchers in past historical eras. Ayurvedic traditional medicine says that Moringa oleifera can prevent 300 diseases and its leaves have been exploited both for preventive and curative purposes [4]. Moreover, a study in the Virudhunagar district of Tamil Nadu India reports Moringa among the species utilized by traditional Siddha healers [5]. Ancient Egyptians used Moringa oleifera oil for its cosmetic value and skin preparation [6]; even if the species never became popular among Greeks and Romans, they were aware of its medical properties [7]. Moringa oleifera has been grown and consumed in its original areas until recently (the 1990s) when a few researchers started to study its potential use in clarifying

water treatments, while only later were its nutritional and medical properties "discovered" and the species was spread throughout almost all tropical countries. In 2001, the first international conference on Moringa oleifera was held in Tanzania and since then the number of congresses and studies increased disseminating the information about the incredible properties of Moringa oleifera. Now this species has been dubbed "miracle tree", or "natural gift", or mother's best friend."

According to Hassan et al. [4]:

"Moringa trees though native in the sub-Himalayan tracts, it is widely cultivated in Africa, Central and South America, Sri Lanka, India, Mexico, Malaysia, Indonesia and the Philippines (Anwar and Bhanger, 2003). According to Muluvi et al (1999), the Moringa tree wide natural spread in the world and introduced to Africa from India where it used as a health supplement and it was originally an ornamental tree in the Sudan, planted during British rule in the alleys along the Nile, public parks, and the gardens of foreigners. It seems likely that the Arab women of Sudan discovered this remarkable clarifier tree (Jahn, 1986)."

Phytochemistry

As Moringa oleifera leaves are most used part of the plant, we review articles concerning phytochemistry and pharmacological properties of leaves. Several bioactive compounds were recognized in the leaves of Moringa oleifera. They are grouped as vitamins, carotenoids, polyphenol, phenolic acids, flavonoids, alkaloids, glucosinolates, isothiocyanates, tannins, saponins and oxalates and phytates. The amounts of different bioactive compounds found in Moringa oleifera leaves and reported in literature are summarized in following tables.
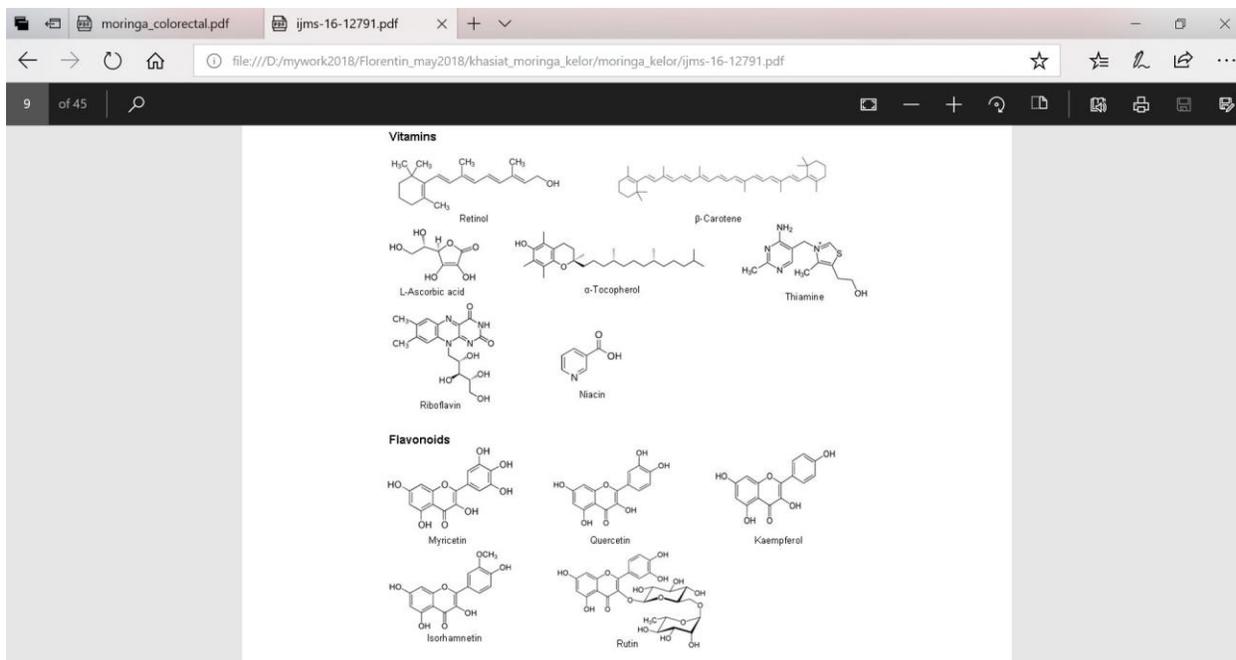
Figure 1. Chemical structures of bioactive compounds in MO. After Leone et al. [5]

Table 1. Vitamins content in *Moringa oleifera* leaves.

Bioactive Compound	Leaves	Value Found in Literature	Value Express as Dry Weight	Drying Method	Extractive Method	Analytical Method	Country	Reference
Vitamins								
Vitamin A	fresh	11,300 IU	45,200 IU		N/A	N/A	India	[14]
	fresh	23,000 IU	92,000 IU [a]		N/A	N/A	Brazil	[52]
Vitamin B1–Thiamine	fresh	0.06 mg/100 g	0.24 mg/100 g		N/A	N/A	India	[14]
	fresh	0.21 mg/100 g	0.84 mg/100 g		N/A	N/A	N/A	[53]
	fresh	0.6 mg/100 g	2.58 mg/100 g		N/A	Microbiological method	India	[54]
	dried	2.64 mg/100 g	2.85 mg/100 g	N/A	N/A	N/A	N/A	[53]
Vitamin B2–Riboflavin	fresh	0.05 mg/100 g	0.20 mg/100 g		N/A	N/A	India	[14]
	fresh	0.05 mg/100 g	0.20 mg/100 g		N/A	N/A	N/A	[53]
	fresh	0.17 mg/100 g	0.726 mg/100 g		N/A	Microbiological method	India	[54]
	dried	20.5 mg/100 g	22.16 mg/100 g	N/A	N/A	N/A	N/A	[53]
Vitamin B3–Niacin	fresh	0.8 mg/100 g	3.20 mg/100 g		N/A	N/A	India	[14]
	fresh	0.8 mg/100 g	3.20 mg/100 g		N/A	N/A	N/A	[53]
	fresh	0.82 mg/100 g	3.5 mg/100 g		N/A	Microbiological method	India	[54]
	dried	8.2 mg/100 g	8.86 mg/100 g	N/A	N/A	N/A	N/A	[53]
	fresh	220 mg/100 g	880 mg/100 g		N/A	N/A	India	[14]
	dried	17.3 mg/100 g	18.7 mg/100 g	N/A	N/A	N/A	N/A	[53]
	dried	92 mg/100 g	92 mg/100 g	Sun-drying for 4 days				
		140 mg/100 g	140 mg/100 g	Shadow-drying for 6 days	N/A	AOAC 2004	India	[55]
Vitamin C–Ascorbic acid		56 mg/100 g	56 mg/100 g	Oven-drying at 60 °C for 1 h				
	dried	38.8 mg/100 g [b]	38.8 mg/100 g [b]	Air-drying	Metaphosphoric acid	Indophenol titration	Pakistan	[56]
	freeze-dried	271 mg/100 g	271 mg/100 g	Freeze-drying	Deionized water	Colorimetric method	Florida, USA	[57]
		920 mg/100 g	920 mg/100 g				Nicaragua	
	freeze-dried	840 mg/100 g	840 mg/100 g	Freeze-drying	6% metaphosphoric acid	Titration against 2,6-dichlorophenolindophenol	India	[58]
		680 mg/100 g	680 mg/100 g				Niger	
	fresh	9.0 mg/100 g	16.21 mg/100 g		N-hexane + ethyl acetate + BHT	Reverse-phase HPLC	Malaysia	[59]
	dried	113 mg/100 g	122.16 mg/100 g	N/A	N/A	N/A	N/A	[53]
Vitamin E–Tocopherol					Microscale saponification and			

Table 2. Vitamin content in MO leaves. After Leone et al. [5]

Table 2. Carotenoids content in *Moringa oleifera* leaves.

Bioactive Compound	Leaves	Value Found in Literature	Value Express as Dry Weight	Drying Method	Extractive Method	Analytical Method	Country	Reference
Carotenoids								
	fresh	6.63 mg/100 g	33.48 mg/100 g		Acetone–n-hexane	HPLC	Taiwan	[62]
	fresh	6.8 mg/100 g	27.22 mg/100 g		N/A	N/A	N/A	[53]
		36 mg/100 g	36 mg/100 g	Sun-drying for 4 days				
β-carotene	dried	39.6 mg/100 g	39.6 mg/100 g	Shadow-drying for 6 days	N/A	AOAC 2004	India	[55]
		37.8 mg/100 g	37.8 mg/100 g	Oven-drying at 60 °C for 1 h				
	dried	16.3 mg/100 g	17.62 mg/100 g	N/A	N/A	N/A	N/A	[53]
	dried	18.5 mg/100 g	20.44 mg/100 g	Air-dried under shade	N/A	HPLC	South Africa	[61]
	freeze-dried	66 mg/100 g	66 mg/100 g	Freeze-drying	Acetone	HPLC	Florida, USA	[57]
Lutein	fresh	6.94 mg/100 g	35.05 mg/100 g		Acetone–n-hexane	HPLC	Taiwan	[62]
	freeze-dried	102 mg/100 g	102 mg/100 g	Freeze-drying	Acetone	HPLC	Florida, USA	[57]

Abbreviation: N/A = Not available.

Table 2. Carotenoids content of MO leaves. After Leone et al. [5]

Table 3. Polyphenols content in *Moringa oleifera* leaves.

Bioactive Compound	Leaves	Value Found in Literature	Value Express as Dry Weight	Drying Method	Extractive Method	Analytical Method	Country	Reference
Polyphenols								
	dried	4581 mgGAE/100 g [a]	4581 mgGAE/100 g [a]	Shade-drying	Water Soxhlet extraction for 18–20 h	Folin-Ciocalteau	India	[63]
		3602 mgGAE/100 g [b]	3602 mgGAE/100 g [b]					
	dried	3290 mgGAE/100 g	3290 mgGAE/100 g	N/A	50% MeOH	Folin-Ciocalteau	India	[64]
	dried	2090 mgGAE/100 g	2090 mgGAE/100 g	N/A	50% MeOH, 100% MeOH and water	Folin-Ciocalteau	India	[65]
	dried	10,504 mgGAE/100 g	10,504 mgGAE/100 g	N/A	Water at 80 °C for 2 h	Folin-Ciocalteau	India	[66]
	dried	10,616 mgGAE/100 g [c]	10,616 mgGAE/100 g [c]	Air-drying	80% MeOH	Folin-Ciocalteau	Pakistan	[56]
Total phenols	dried	10,300 mgGAE/100 g	10,300 mgGAE/100 g	Air-drying	100% MeOH	Extraction by shaker	Folin-Ciocalteau	Pakistan	[67]
		12,200 mgGAE/100 g	12,200 mgGAE/100 g		80% MeOH				
		9720 mgGAE/100 g	9720 mgGAE/100 g		100% EtOH				
		11,600 mgGAE/100 g	11,600 mgGAE/100 g		80% EtOH				
	dried	9630 mgGAE/100 g	9630 mgGAE/100 g	Air-drying	100% MeOH	Extraction by reflux	Folin-Ciocalteau	Pakistan	[67]
		10,700 mgGAE/100 g	10,700 mgGAE/100 g		80% MeOH				
		6160 mgGAE/100 g	6160 mgGAE/100 g		100% EtOH				
		8210 mgGAE/100 g	8210 mgGAE/100 g		80% EtOH				
	dried	2070 mg TAE/100 g	2070 mg TAE/100 g	Air-drying	Acetone/Water (7:3)	Folin-Ciocalteau	India	[68]
	dried	1600 mgTEA/100 g [d]	1600 mgTEA/100 g [d]	Air-drying	80% EtOH	Folin-Ciocalteau	Nicaragua	[69]
		3400 mgTEA/100 g [e]	3400 mgTEA/100 g [e]					
	dried	5350 mgCAE/100 g	5350 mgCAE/100 g	Oven-drying at 60 °C for 24 h	Maceration with 70% EtOH	Folin-Ciocalteau	Thailand	[70]
		2930 mgCAE/100 g	2930 mgCAE/100 g		Maceration with 50% EtOH			
		3710 mgCAE/100 g	3710 mgCAE/100 g		Percolation with 70% EtOH			
		3280 mgCAE/100 g	3280 mgCAE/100 g		Percolation with 50% EtOH			
		4550 mgCAE/100 g	4550 mgCAE/100 g		Soxhlet extraction with 70% EtOH			
		4460 mgCAE/100 g	4460 mgCAE/100 g		Soxhlet extraction with 50% EtOH			

Table 3. Polyphenols content of MO leaves. After Leone et al. [5]

Anticancer effects

According to Vergara-Jimenez et al.:[1]

"MO has been studied for its chemopreventive properties and has been shown to *inhibit the growth of several human cancer cells*. The capacity of MO leaves to protect organisms and cells from oxidative DNA damage, associated with cancer and degenerative diseases, has been reported in several studies. Khalafalla et al. found that the extract of MO leaves inhibited the viability of acute myeloid leukemia, acute lymphoblastic leukemia and hepatocellular carcinoma cells. Several bioactive compounds, including 4-(α-L-rhamnosyloxy) benzyl isothiocyanate, niazimicin and β-sitosterol-3-O-β-D-glucopyranoside present in MO, may be responsible for its anti-cancer properties. MO leaf extract has also been proven to be efficient in pancreatic and breast cancer cells.

In pancreatic cells, MO was shown to contain the growth of pancreatic cancer cells, by inhibiting NF-kB signaling as well as increasing the efficacy of chemotherapy, by enhancing the effect of the drug in these cells. In breast cancer cells, the antiproliferative effects of MO were also demonstrated. A recent study by Abd-Rabou et al. evaluated the effects of various extracts from Moringa Oleifera, including leaves and roots, and preparations of nanocomposites of these compounds against HepG, breast MCF7 and colorectal HCT116/Caco2 cells. All these preparations were effective on their cytotoxic impact, as measured by apoptosis. Several animal studies have also confirmed the efficacy of Moringa Oleifera leaves in preventing cancer in rats with hepatic carcinomas induced by diethyl nitrosamine and in suppressing azoxymethane-induced colon carcinogenesis in mice. A list of some bioactive components present in MO leaves, their postulated actions in the animal model used, their protection against a specific disease and the corresponding reference are presented in Table 1."

Table 4. Bioactive components in MO. (After Vergara-Jimenez et al. [1])

Moreover, according to Abdull Razis et al., MO leaves also have anti-inflammatory, antitumour and anticancer effects.[2]

Hypotheses on MO chemopreventive effects

According to Budda et al. [3]:

> "We speculated that the chemopreventive effect of bMO arose from fatty acids present in MO which might modulate cell proliferation and/or apoptosis and anti-inflammation which plays an important role in colon carcinogenesis. It has been reported that human colon tumor growth is promoted by oleic acid through mechanisms that comprise an increase in fatty acid oxidation and disturbance of membrane enzymes (Suziki et al., 1997; Calder et al., 1998). In contrast, olive oil, an important source of omega-9 oleic fatty acid, may prevent against the development of colorectal cancer through its influence on secondary bile acid patterns in the colon. ..
> Another hypothesis for chemopreventive effect of MO pods may be due to the modulation of detoxification enzyme. It has been shown that MO pods extract has the potential for modulating phase I and II enzymes such as cytochrome b5, cytochrome P450, catalase, glutathioneperoxidase, reductase and S-transferase in mice (Bharali et al., 2003). Moreover, the diet containing bMO showed potentially anti-clastogenic activity against both direct and indirect-acting clastogens in male ICR mice (Promkum et al., 2010). In the present study, a potent colon carcinogen, AOM, was used to induce colon carcinogenesis, so bMO in the diet might act via the carcinogenesis processes through metabolic activation (Fiala et al., 1977)."

Concluding remarks

We have discussed some real positive effects on the use and efficacy of Moringa Oleifera as anticancer treatment.

Nonetheless, further studies and procedures to maximize such positive impact of MO as anticancer should be continued.

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Chapter 15

Remark on Five Applications of Neutrosophic Logic: in cultural psychology, economics theorizing, conflict resolution, philosophy of science, and cosmology

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Abstract
In this short article, we review five applications of NFL which we have explored in a number of papers. Hopefully the readers will find a continuing line of thoughts in our research in the last few years.

Introduction: what is Neutrosophic Logic?

A definition is given here: Neutrosophic Logic is (Or "Smarandache logic") A generalisation of fuzzy logic based on Neutrosophy.[89] A proposition is t true, i indeterminate, and f false, where t, i, and f are real values from the ranges T, I, F, with no restriction on T, I, F, or the sum n=t+i+f. Neutrosophic logic thus generalises:

- intuitionistic logic, which supports incomplete theories (for 0<n<100 and i=0, 0<=t,i,f<=100);

- fuzzy logic (for n=100 and i=0, and 0<=t,i,f<=100);

- Boolean logic (for n=100 and i=0, with t,f either 0 or 100);

- multi-valued logic (for 0<=t,i,f<=100);

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[89] http://fs.unm.edu/NeutLog.txt

- paraconsistent logic (for n>100 and i=0, with both t,f<100);

- dialetheism, which says that some contradictions are true (for t=f=100 and i=0; some paradoxes can be denoted this way).

Compared with all other logics, neutrosophic logic introduces a percentage of "indeterminacy" - due to unexpected parameters hidden in some propositions. It also allows each component t,i,f to "boil over" 100 or "freeze" under 0. For example, in some tautologies t>100, called "overtrue."

So, in this chapter we will review Neutrosophic Logic, a new theory developed in recent decades by one of these authors (FS).

Vern Poythress argues that sometimes we need a modification of basic philosophy of mathematics, in order to re-define the redeemed mathematics [6].

In this context, allow us to argue in favor of Neutrosophic logic as one basic postutale, in lieu of the Aristotle logic which creates so many problems in real world.

In Neutrosophy, we can connect an idea with its opposite idea and with its neutral idea and get common parts, i.e. <A> /\ <nonA> = nonempty set. The common part of the uncommon things! It is true/real... paradox. From neutrosophy, all started: neutrosophic logic, neutrosophic set, neutrosophic probability, neutrosophic statistics, neutrosophic measure, neutrosophic physics, neutrosophic algebraic structures etc.

It is true in restricted case, i.e. the Hegelian dialectics considers only the dynamics of opposites (<A> and <antiA>), but in our everyday life, not only the opposites interact, but the neutrals <neutA> between them too. For example: you fight with a man (so you both are the opposites). But neutral people around both of you (especially the police) interfere to reconcile both of you. Neutrosophy considers the dynamics of opposites and their neutrals.

So, neutrosophy means that: <A>, <antiA> (the opposite of <A>), and <neutA> (the neutrals between <A> and <antiA>) interact among themselves. A neutrosophic set is characterized by a truth-membership function (T), an indeterminacy-membership function (I), and a falsity-membership function (F), where T, I, F are subsets of the unit interval [0, 1].

As particular cases we have: single-valued neutrosophic set {when T, I, F are crisp numbers in [0, 1]}, and interval-valued neutrosophic set {when T, I, F are intervals included in [0, 1]}.

Neutrosophic Set is a powerful structure in expressing indeterminate, vague, incomplete *and* inconsistent information.

In this short review article, we discuss 5 applications of NL theory.

5 applications of NL in various fields of science:

a. <u>cultural psychology</u>

Culture is a shared meaning system, found among those who speak a particular language dialect, during a specific historic period, and in a definable geographic region.

Collectivism is a **cultural** pattern found in most traditional societies, especially in Asia, Latin America, and Africa. It contrasts with **individualism**, which is a **cultural** pattern found mostly in America and Europe.

This theme was expored by Prof. Harry Triandis.[90] Triandis was born in Greece in 1926.[2] During the Second World War, he learned four foreign languages and developed his curiosity about the differences that exist between cultures. His time getting to know people across various European nations inspired him to research cultural disparities in the way people think.

This issue can be reconciled by the help of NL theory.

b. <u>economics theorizing [3]</u>

In a series of papers, we outlined a more general approach to reconcile those classical tension between individualism-collectivism. In our opinion, our tendency to cooperate or compete is partly influenced by the culture that we inherit from our ancestors. One of us (VC) once lived for a while in Russia, and he found that many people there are rather cold and distant (of course not all of them, some are friendly). He learned that such a trait

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[90] https://www.researchgate.net/profile/Harry_Triandis

is quite common in many countries in Europe. They tend to be individual and keep a distant to each other. In physics term, they are like *fermions*.[91]

There is a developmental psychology hypothesis that suggests that perhaps such a trait co-relates to the fact that many children in Europe lack nurtures and human touch from their parents, which make them rather cold and individual. Of course, whether this is true correlation, it should be verified.

On the contrary, most people in Asia are gregariously groupie (except perhaps in big metropolitans). They tend to spend much time with family and friends, just like many Italians. They attend religious rituals regularly, and so on. In physics term, they are *bosons*. Of course, this sweeping generalization may be oversimplifying.[92]

Therefore, it seems quite natural to us, why Adam Smith wrote a philosophy book suggesting that individual achievement is a key to national welfare (because he was a British which emphasized individualism).[93] It took more than hundred years until mathematicians like John F. Nash, Jr. figured it out that individual pursuit toward their own goals will not lead them to achieve a common goal as society.[94]

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[91] While our proposed simplifying analogy of human behaviour, i.e. individualism and collectivism sound not so common. Indeed such cultural psychology research has been reported since Harry C. Triandis et al. See for example: (a) The Self and Social Behavior in Differing Cultural Contexts, Psychological Review, vol. 96 no. 3; (b) Harry C. Triandis and Eunkook M. Suh, CULTURAL INFLUENCES ON PERSONALITY, Annu. Rev. Psychol. 2002. 53:133–60; (c) J. Allik & A. Realo, Individualism-collectivism and social capital, JOURNAL OF CROSS-CULTURAL PSYCHOLOGY, Vol. 35 No. 1, January 2004, 29-49. This last mentioned paper includes a quote from Emile Durkheim: "The question that has been the starting point for our study has been that of the connection between the individual personality and social solidarity. How does it come about that the individual, whilst becoming more autonomous, depends ever more closely upon society? How can he become at the same time more of an individual and yet more linked to society?"

[92] After writing up this article, we found that Sergey Rashkovskiy also wrote a quite similar theme, albeit with a statistical mechanics in mind. The title of his recent paper is: "'Bosons' and 'fermions' in social and economic systems." Here is abstract from his paper: "We analyze social and economic systems with a hierarchical structure and show that for such systems, it is possible to construct thermostatistics, based on the intermediate Gentile statistics. We show that in social and economic hierarchical systems there are elements that obey the Fermi-Dirac statistics and can be called fermions, as well as elements that are approximately subject to Bose-Einstein statistics and can be called bosons. We derive the first and second laws of thermodynamics for the considered economic system and show that such concepts as temperature, pressure and financial potential (which is an analogue of the chemical potential in thermodynamics) that characterize the state of the economic system as a whole, can be introduced for economic systems." Url: https://arxiv.org/ftp/arxiv/papers/1805/1805.05327.pdf

[93] If only Adam Smith was born in Bangkok or Manila, probably he wrote his book in a different way.

[94] Imagine 10 players of a football team go simultaneously to make a goal to their opposite team, will they succeed? Of course no, they should arrange according to their coach's instruction: 1-4-4-2, or other type of arrangement.

So, which is better: *to be like fermions or bosons*? Our opinion is: just like in particle physics, both fermions and bosons are required. In the same way, fermion behavior and boson behavior are both needed to advance the quality of life. Fermion people tend to strive toward human progress, while boson people are those who make us alive.

This issue again can be reconciled by the help of NL theory, i.e. such a human tension is always there, but they don't have to be conflicts, just like in classic tensions between capitalism (emphasizing individual achievements) and socialism.

c. <u>conflict resolution [5]</u>
Binary choices are another source of problems. As a one-liner joke says:

> There are two kinds of people in the world: Those who think there are two kinds of people in the world and those who don't. (Plus some others who aren't sure.) [95]

A funnier joke on binary logic:

> There are 10 kinds of people in the world: Those who understand binary and those who don't.[96]

As Phillipe Schweizer remarked:

> "These two possibilities, these alternatives, are the basis of cognition, and allow choice and therefore action through the fact that a preference becomes possible: either I prefer there is X, or I prefer there is no X. Then autonomy appears. And indeed the valuation or affect too: "I like" or "I don't like", and it goes with it together.
> The stages described here are not as distinct as those of Piaget, they overlap, include and extend. The "there is no" is opposed to the "there is" forming the opposite. Thus the binary appears and the logic of the same name also: either "there is", or "there is not": X or non-X, one and the other being mutually exclusive.
> …There is this and that and that again: a perception of the environment, a representation of a situation as a collection of objects. Our other most frequent and fundamental conception is opposition: there is or there is not. What also gives one thing and its opposite: day and night, hot and cold, big and small ... The importance of this simplifying binary conception of two situations sliced

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[95] http://philippe.ameline.free.fr/humor/TwoKindOfPeople.htm
[96] http://philippe.ameline.free.fr/humor/TwoKindOfPeople.htm

diametrically away in opposite is the most prominent form of mental life. It is the emblematic *form of a choice.*"[97]

In this regards, One of us (FS) recently published a new book, with title: *Neutropsychic personality*.[13] In this book, FS described possible extension of Freudian mental model: *id-ego-superego*, using his Neutrosophic Logic theory. His definition of Neutropsychic is as follows:

> "Neutropsyche is the psychological theory that studies the soul or spirit using the neutrosophy and neutrosohic theories. It is based on triadic neutrosophic psychological concepts, procedures, ideas, and theories of the form (<A>, <neutA>, <antiA>), such as (positive, neutral, negative), (good behavior, ignorant behavior, bad behavior), (taking the decision to act, pending, taking the decision not to act), (sensitive, moderate, insensitive), (under-reacting, normally reacting, over-reacting), (under-thinking, normal thinking, over-thinking), and so on, and their refinements as (<Aj>, <neutAj>, <antiAj>)." [13, p.29]

Perhaps it would be necessary to develop an improved model of neutropsychic basis of decision making process.

Another possible way of resolution of this fundamental problem of human societies, is to accept the otherness, without being absorbed that otherness. In other words, we should try to find common trust, where people can do dialogue and do peaceful co-existence. While this notion of peaceful co-existence belong to social psychology, we can also think of them starting from principle of contradiction, proposed by Kolmogorov. To summarize, he argues that there is fundamental problem in developing complex arguments, they always lead to contradiction. This is proven later by Godel.

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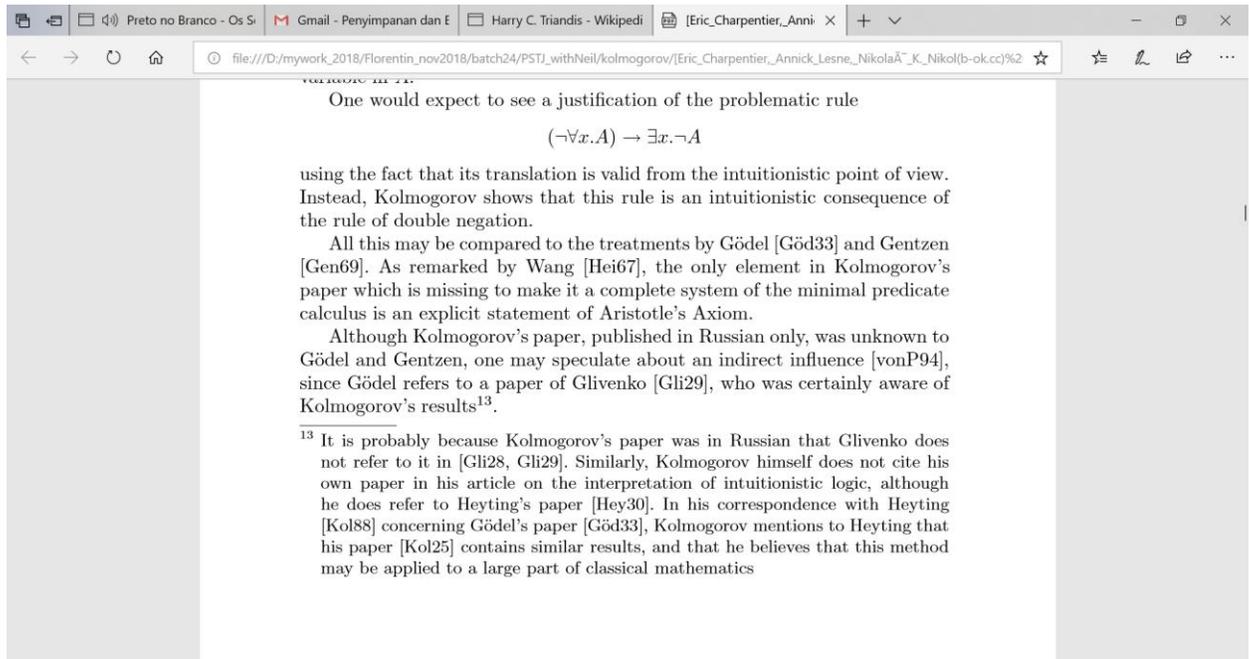
Figure 1. Screenshot from ref. [2].

d. philosophy of science

In a book we have just completed with a number of contributors, there is special chapter whether two authors argued on empiricism vs. logicism. While that was a quite intense debate, after Publisher's request for abstract to that particular chapter, one of us (VC) put these wordings:

Abstract

In this chapter, two authors from different backgrounds engage in an intense dialogue over empiricism and logic in developing physical theories. At one side, Neil Boyd argues that observation and direct experience are very essential to find the truth, probably because of his interpretation of Godel's incompleteness theorem. On the other side, Akira Kanda argues among other things: "Typical experimental physicists does not want to discuss anything out of empiricism. They do not know the way how empiricism was developed. For them, empiricism became an absolute religion not to be questioned. As I pointed out the biggest founder of empiricism, Hume, admitted that empiricism is not just induction upon empirical data, it is standing upon some fundamentally important non-empirical truth such as mathematics." In essence, this is an old problem in theoretical physics, which is most significant: to meditate and observe, or to derive theory based on a few axioms? Perhaps the answer is not so easy to grasp, but both approaches are complementary. Such an intensity of this dialogue can be viewed as reflecting the message of this book: there are serious old problems which call for attention by modern physicists and mathematicians alike.

This can be viewed as another case which calls for implementation of NL theory: whenever there are two opposite sides, there is always a choice to keep at neutral side.

e. Cosmology [7]

Questions regarding the formation of the Universe and what was there before the existence of Early Universe have been great interest to mankind of all times. In recent decades, the Big Bang as described by the Lambda CDM-Standard Model Cosmology has become widely accepted by majority of physics and cosmology communities. Among other things, we can cite A.A. Grib & Pavlov who pointed possible heavy particles creation out of vacuum and also other proposal such as *Creatio Ex-Nihilo theory* (CET).[36-37]

But the philosophical problems remain, as Vaas pointed out: Did the universe have a beginning or does it exist forever, i.e. is it eternal at least in relation to the past? This fundamental question was a main topic in ancient philosophy of nature and the Middle Ages. Philosophically it was more or less banished then by Immanuel Kant's *Critique of Pure Reason*. But it used to have and still has its revival in modern physical cosmology both in the controversy between the big bang and steady state models some decades ago and in the contemporary attempts to explain the big bang within a quantum cosmological framework.

Interestingly, Vaas also noted that Immanuel Kant, in his *Critique of Pure Reason* (1781/1787), argued that it is possible to prove both that the world has a beginning and that it is eternal (first antinomy of pure reason, A426f/B454f). As Kant believed he could overcome this „self-contradiction of reason" („*Widerspruch der Vernunft mit ihr selbst*", A740) by what he called „*transcendental idealism*", the question whether the cosmos exists forever or not has almost vanished in philosophical discussions.

In a paper accepted recently by Asia Mathematika J., we take a closer look at Genesis 1:2 to see whether the widely-accepted notion of *creatio ex-nihilo* is supported by Hebrew Bible or not. It turns out that Neutrosophic Logic is in agreement with Kant and Vaas's position, it offers a resolution to the long standing disputes between beginning and

eternity of the Universe. In other words, in this respect we agree with Vaas: "how a conceptual and perhaps physical solution of the temporal aspect of Immanuel Kant's „*first antinomy of pure reason*" is possible, i.e. how our universe in some respect could have both a beginning and an eternal existence. Therefore, paradoxically, *there might have been a time before time or a beginning of time in time*."

To summarize, Neutrosophic Logic study the dynamics of neutralities. And from this viewpoint, we can understand that it is indeed a real possibility that the Universe has both initial start (creation) but with eternal background. This is exactly the picture we got after our closer look at Gen. 1:1-2.

Concluding remark

In this short article, we review five applications of NFL which we have explored in a number of papers. Hopefully the readers will find a continuing line of thoughts in our research in the last few years, emphasizing our better understanding of various branches of human knowledge. All of these branches were enhanced and elevated to a higher level through applications of NL theory.

Version 1.0: 28 nov, 2018, pk. 3:33

VC & FS

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Chapter 16

Wearable electronics for energy harvesting from human body frequency: An exploration in Huygens' principle applied to nanogenerators

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Abstract

Wearable electronics have gained dramatic development in recent years, owing to the advancement in flexible/stretchable electronics, and achieved considerable progress in various applications. Nanogenerators capable of harvesting energy from human activities is considered as a promising alternative for powering the wearable electronic devices, considering the sustainability and rich biomechanical energy from human body. Nowadays, most of the nanogenerators are aimed at converting limited forms of mechanical energy, mostly pressing or bending, which hampers adaptive exploitation of bodily energy source. In this paper, we give an outline on how we can develop special nanogenerators which are able to transform human body frequency to energize wearable electronics. While some nanogenerators are available for transforming low frequency, as far as we know, no such wearable electronics are available for tapping human body frequency at the order of megahertz.

Introduction

Wearable electronics have gained dramatic development in recent years, owing to the advancement in flexible/ stretchable electronics, and achieved considerable progress in various applications. Nanogenerators capable of harvesting energy from human activities is considered as a promising alternative for powering the wearable electronic devices, considering the sustainability and rich biomechanical energy from human body. Nowadays, most of the nanogenerators are aimed at converting limited forms of mechanical energy, mostly pressing or bending, which hampers adaptive exploitation of bodily energy source.[12]

In this paper, we will give a deeper look on theoretical basis of nanogenerators, which can be related to displacement current in Maxwell equations. We also discuss shortly how Maxwell equations can be fully developed by virtue of Huygens' Principle.

In the next section, we will discuss dynamics equations for tapping frequency which will be useful in developing such a wearable electronics.

We will end this paper with a discussion section on possible future development.

What is human body frequency?

In 1992, Bruce Tainio of Tainio Technology, an independent division of Eastern State University in Cheny, Washington, built the first frequency monitor in the world. Tainio has determined that the average frequency of the human body during the daytime is 62-68 MHz. A healthy body frequency is 62-72 MHz . When the frequency

drops, the immune system is compromised. A list of discovered vibrational frequencies can be found in the Appendix section.

Part I. On theoretical basis of nanogenerators

Huygens' Principle (HP) contains both the principle of action-at-proximity and the superposition principle. Although the propagation of sharp, non-spreading wave fronts is included in Huygens' (1690) original formulation, it can be left out without touching those principles. The formulation of HP by means of the Chapman-Kolmogorov equation (following Feynman 1948) comprises both versions and overcomes misunderstandings like "Huygens' principle is not exactly obeyed in Optics" (Feynman 1948) and "HP is incompatible with Green's functions" (Johns 1974). This way, HP applies not only to the propagation of light, but also to heat and matter diffusion which can be described through explicit linear differential and difference equations, respectively. HP for Maxwell's equations is discussed in terms of the Helmholtz-decomposed fields and currents.[10]

In the meantime, in a series of recent papers, Wang discusses possible applications of a novel concept for energy harvesting called triboelectric nanogenerators. Self-powered system is a system that can sustainably operate without an external power supply for sensing, detection, data processing and data transmission. Nanogenerators were first developed for self-powered systems based on piezoelectric effect and triboelectrification effect for converting tiny mechanical energy into electricity, which have applications in internet of things, environmental/infrastructural monitoring, medical science and security. In this paper, we present the theoretical reasoning of the nanogenerators starting from the Maxwell equations.[1]

In the Maxwell's displacement current, the first term gives the birth of electromagnetic wave, which is the foundation of wireless communication, radar and later the information technology. Our study indicates that the second term in the Maxwell's displacement current is directly related to the output electric current of the nanogenerator; meaning that our nanogenerators are the applications of Maxwell's displacement current in energy and sensors. By contrast, electromagnetic generators are built based on Lorentz force driven flow of free electrons in a conductor.[2]

It appears to us that the only way to figure out the reality of Maxwell's displacement current is either to measure it with capacitor [8], or use it for nanogenerators [2]. In other words, it seems possible that future nanogenerators will expose the hidden reality behind displacement current, or may be a new term needs to be added. Therefore, in the present paper we will discuss an extended version of Maxwell's equations based on Huygens' Principle. It is shown that there is new term for displacement current.

1. Several different interpretations of Maxwell's displacement current

Our discussion starts from the fundamental Maxwell's equations that unify electromagnetism[2]:

$$\nabla \cdot B = 0 (Magnetic Gauss),$$
$$\nabla \cdot D = \rho_f (Gauss),$$
$$\nabla \times E + \partial_t B = 0 (Faraday),$$
$$\nabla \times H - \partial_t D = J_f (Ampere circuital law),$$

(1)

Where the electric field E; the magnetic field B; magnetizing field H; the free electric charge density ρ_f; the free electric current density J_f; displacement field D,

$$D = \varepsilon_o E + P. \tag{2}$$

In fourth equation of (1), the second term in l.h.s. of the equation is the Maxwell's displacement current defined as

$$J_D = \partial_t D = \varepsilon_0 \frac{\partial E}{\partial t} + \frac{\partial P}{\partial t}. \tag{3}$$

The displacement current was first postulated by Maxwell in 1861 [1], and it was introduced on consistency consideration between Ampere's law for the magnetic field and the continuity equation for electric charges. The displacement current is not an electric current of moving free charges, but a time-varying electric field (vacuum or media), plus a contribution from the slight motion of charges bound in atoms, dielectric polarization in materials. In Eq. (3), the first component in the displacement current gives the birth of electromagnetic wave, which later being taken as the approach for developing radio, radar, TV and long distance wireless communication.

It can be shown that there is relationship between the second term in the displacement current and the output signal from nanogenerators, and show the contribution of displacement current to energy and sensors in the near future. [2]

In this paper, we briefly mention two applications of displacement current:[2]

(1) <u>Piezoelectric nanogenerator</u>, where the displacement current from the media polarization is:

$$J_{Di} = \frac{\partial P_i}{\partial t} = (e)_{ijk}\left(\frac{\partial s}{\partial t}\right)_{jk}. \tag{4}$$

(2) <u>Triboelectric nanogenerator,</u> where the displacement current can be expressed as:

$$J_D = \frac{\partial D_z}{\partial t} = \frac{\partial \sigma_I(z,t)}{\partial t} = \sigma_c \frac{dz}{dt} \frac{d_1\varepsilon_0/\varepsilon_1 + d_2\varepsilon_0/\varepsilon_2}{\left(d_1\varepsilon_0/\varepsilon_1 + d_2\varepsilon_0/\varepsilon_2 + z\right)^2}. \tag{5}$$

Nonetheless, it is known for experts in classical electromagnetic theory, that there are various opinions concerning the meaning and physical reality of equation (3). For experts, see for instance Marco Landini [4], Jackson [5], and Selvan [7]. Here we will only cite some remarks by Tombe [6], as follows:

a. *Maxwell's original approach*: Maxwell conceived the idea of displacement current in connection with elasticity. He had proposed a sea of molecular vortices to explain electromagnetic phenomena, and those vortices were surrounded by electric particles that acted as idle wheels. His views on displacement current can be read in the introduction to part III of his 1861 paper 'On Physical Lines of Force' (beginning at page 39 in the pdf file) at [1]. Maxwell was never satisfied that his molecular vortex model represented a totally accurate picture, and so his attempt to explain the detailed physical significance of displacement current in relation to the rotational aspect of his molecular vortices was somewhat vague. He seemed to be saying that the force involved in displacement current is a tangential force which alters the state of angular momentum of the vortices, and that electromagnetic radiation is therefore a propagation of fine-grained angular acceleration. The angular momentum H would therefore be at right angles and in phase with the tangential force E. Maxwell added displacement current to Ampère's Circuital Law in order to make it applicable to 'Total Current', but it is clear that he did not intend the applicability of this modified version of

Ampère's Circuital Law to be restricted to the vicinity of electric current circuits. His follow up work indicates that he intended it to apply anywhere where electromagnetic radiation exists. There seems to be a popular idea circulating around that Maxwell conceived of displacement current in conjunction with the electric capacitor circuit, but this idea is not found in his original papers. [6]

b. *The Modern Textbook Approach:* The modern textbook approach to displacement current is quite different to Maxwell's approach. It is based on the idea that Ampère's Circuital Law needs to be modified in order to comply with situations, such as that which arises in the capacitor circuit, in which charge density is varying with time. Displacement current is then added to one side of Ampère's Circuital Law as an additional term, but it is added on the basis that it is not a real current. The fact that modern displacement is not a real current means that the Ampère's Circuital Law equation has been unbalanced by virtue of adding a new term to one side only. This approach however creates two problems. First of all, the justification for unbalancing the equation is based on the philosophy that the end justifies the means. That is a highly dubious approach when it comes to interfering with equations that have already been derived in the state that they are in. A closer look at the situation further shows that the additional term does not address the issue which it is said to be addressing.[6]

c. *The Polarization approach:* A current flows in a capacitor circuit. This in turn causes a linear polarization of the dielectric between the capacitor plates which blocks the current flow. Linear polarization is a self restoring elastic effect and it is roughly what Maxwell had in mind for displacement current. Maxwell considered displacement current to differ from free current in that the elasticity of the medium would cause the displacement current to grind to a halt. However, as regards electromagnetic radiation, the displacement in question would have to be an angular displacement as opposed to a linear displacement. And in that regard it is interesting to note that Maxwell's concept of polarization was not the straightforward linear effect that we have in mind. In part III of Maxwell's 1861 paper, he says "I conceived the rotating matter to be the substance of certain cells, divided from each other by cell-walls composed of particles which are very small compared with the cells, and that it is by the motions of these particles, and their tangential action on the substance in the cells, that the rotation is communicated from one cell to another." [1]

To conclude this matter, again allow us to cite Tombe [6]:

"The modern day displacement current is a highly dubious virtual concept, and it bears no connection to what Maxwell had in mind. Conservation of charge in a capacitor circuit is not an issue which is in anyway addressed by displacement current. Conservation of charge is a
hydrodynamical issue that is catered for by Bernoulli's Principle whereby voltage and charge represent pressure and current represents velocity. Charge variation with time is not a matter which is catered for in any respect within the realm of Ampère's Circuital Law. If we wish to add a displacement current term to Ampère's Circuital Law then we must justify it in terms of real current just as Maxwell did."

It appears to us that the only way to figure out the reality of Maxwell's displacement current is either to measure it with capacitor [8], or use it for nanogenerators [2]. In other words, it seems possible that future nanogenerators will expose the hidden reality behind displacement current, or may be a new term should be added.

2. Huygens' Principle and Maxwell equations

According to Enders [10], Huygens' principle can be applied to rewrite Maxwell equations in complete form, starting with:

$$\nabla \cdot \vec{B}_L = 0 \, (Magnetic Gauss),$$
$$\nabla \cdot \vec{D}_L = \rho_f \, (Gauss),$$
$$\nabla \times \vec{E}_T + \partial_t \vec{B}_T = 0 \, (Faraday),$$
$$\nabla \times \vec{H}_T - \partial_t \vec{D}_T = \vec{J}_T \, (Ampere\ circuital\ law), \tag{6}$$

It is seen that the Helmholtz decomposition genuinely relates the propagation of electromagnetic waves with the transverse field components only. Its drawback – and, perhaps, reason of low acceptance – consists in the fact that it is not Lorentz covariant, so that it has to be separately performed in each system of reference. The criterion of being compatible with special relativity is, however, not the Lorentz covariance, but the compatibility with the Poincare group (Dirac 1949). [10]

Let us further assume that:

$$\vec{D}_T = \begin{pmatrix} D_x(z) \\ D_y(z) \\ 0 \end{pmatrix}; \vec{B}_T = \begin{pmatrix} B_x(z) \\ B_y(z) \\ 0 \end{pmatrix}; \vec{J}_T = \begin{pmatrix} j_x(z) \\ j_y(z) \\ 0 \end{pmatrix}. \tag{7}$$

Then, the four independent dynamical variables ($B_{x,y}, D_{x,y}$) obey the *complete* set of equations:

$$\frac{\partial}{\partial t}\begin{pmatrix} B_x \\ B_y \\ D_x \\ D_y \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & \frac{1}{\varepsilon_0}\frac{\partial}{\partial z} \\ 0 & 0 & -\frac{1}{\varepsilon_0}\frac{\partial}{\partial z} & 0 \\ 0 & -\frac{1}{\mu_0}\frac{\partial}{\partial z} & 0 & 0 \\ \frac{1}{\mu_0}\frac{\partial}{\partial z} & 0 & 0 & 0 \end{pmatrix}\begin{pmatrix} B_x \\ B_y \\ D_x \\ D_y \end{pmatrix} - \begin{pmatrix} 0 \\ 0 \\ j_x \\ j_y \end{pmatrix}. \tag{8}$$

The above set of equations (8) may be combined with equations (4) and (5) for piezoelectric and *triboelectric nanogenerators.* Nonetheless, these complete set of equations need to be verified with experiments.

Part 2. On more practical considerations of wearable electronics

3. Dynamical equations for tapping human body frequency
Wearable devices are becoming a focus of today's research for the era of functional systems. As one may have already noticed from his/her daily life, the enjoyment of these exciting innovations such as biofeedback and tracking

of physiological function relies heavily on the development of sustainable power sources. Electrochemical cells, such as Li-ion batteries, which are currently the dominant mobile power sources for portable electronic devices, are considered the powerhouse for the personal digital electronic revolution starting from about two decades ago. However, most of these traditional batteries are cumbersome and cannot work in a self-powered mode, which are not ideal for tiny malleable device.[14]

The addition of a hybridized nanogenerator (NG) is considered one solution to this problem, which depends on the generation of the required electrical power by converting one of the ambient environmental energy sources. Vibration energy sources are our focus because it is readily available and unlimited in nature. To convert the mechanical vibration into electrical energy, there are three commonly used transduction mechanisms: electromagnetic, triboelectric, and piezoelectric among which electromagnetic and triboelectric nanogenerator (TENG) are the two mostsuitable approaches. The TENG can harvest the mechanical energy from the contact/separation and sliding friction between two triboelectric materials.[16]

In reference [14], a method has been presented to tap low frequency motion from shoe soles. Deane et al. [15] have presented power estimation which can be generated from nanogenerators, using Fourier expansion etc.

Human body motion is highly regarded as a promising source of energy for powering body-worn electronic devices and health monitoring sensors. Transforming the human biomechanical energy into an electrical energy provides a sustainable energy to drive those devices and sensors, reducing their battery dependency. In this section, we will discuss dynamical governing equations for transforming body frequency into power.[13]

There have been some efforts to harness energy from basic human activities, such as handshaking, walking, running, and limb movement. However, there is a challenge when dealing with harvesting vibration energy from human-body-induced motion because of its low frequency (less than 10Hz), large amplitude during natural, irregular motion, and continuously fluctuation with time. In this respect, we consider to be fruitful to take a look into the vibrational frequencies of human body, which already known for quite some time (see Appendix). Since the organ frequency is at the order of megahertz, it can be expected that they will likely to generate larger energy, more than tapping energy from shoe soles, for instance.

As it has been reported in [16], a springless hybridized NG (nanogenerator) was newly designed to have a non-resonant behavior, in which the output power continuously increases with the input frequency and amplitude. To achieve a considerably higher output power generation at low-frequency vibrations and low amplitude, the proposed springless hybrid electromagnetic and triboelectric nanogenerator (SHEMG-TENG) utilizes a dual-Halbach array, which is fabricated with contact-separation and sliding-mode TENGs. The proposed SHEMG-TENG is fabricated and verified from a vibration exciter and human-body-induced vibration.

In the meantime, by applying an *input vibration* y(t) to the energy harvester housing, the equation of motion of the dual-Halbach magnet array frame can be represented as [16]:

$$m\ddot{y} + c_t\dot{x} + \frac{x}{|x|}F + \frac{\dot{x}}{|\dot{x}|}\xi mg = 0 \tag{9}$$

where m is the DHA frame mass, y is the absolute dual Halbach magnet array frame displacement, $x = y - y_i$ is the array frame relative displacement, F is the impact force with stoppers (TENG materials), c_t is the total damping coefficient, and ζ is the Coulomb friction coefficient. The contact between the rectangular dual-Halbach magnet array frame and the rectangular end stopper can be approximated to rectangular to full-space contact. Hence, the impact force can be modeled which is a modified Hertz contact model that considers the elastic, as well as the damping nature of the stricken bodies.[16]

The above equation (9) represents dynamics equation to transform human body frequency into electric power, and it can be expected that organ frequency can be used to generate energy enough to power wearable electronics.

4. Discussion and Concluding Remarks

In recent years, there is a growing number of proposals to use a novel concept of energy harvesting using nanogenerators. This concept can be used for water wave energy harvesting, wind energy harvesting, but also for self-powered microdevices. This novel concept is based on the reality of Maxwell's displacement current. In this paper, we discuss some aspects of Maxwell's displacement current, along with a related principle which can be attributed to Huygens (1690).

There have been some efforts to harness energy from basic human activities, such as handshaking, walking, running, and limb movement. However, there is a challenge when dealing with harvesting vibration energy from human-body-induced motion because of its low frequency (less than 10Hz), large amplitude during natural, irregular motion, and continuously fluctuation with time. In this respect, we consider to be fruitful to take a look into the vibrational frequencies of human body, which already known for quite some time (see Appendix). Since the organ frequency is at the order of megahertz, it can be expected that they will likely to generate larger energy, more than tapping energy from shoe soles, for instance.

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Appendix: Vibrational frequency list

In 1992, Bruce Tainio of Tainio Technology, an independent division of Eastern State University in Cheny, Washington, built the first frequency monitor in the world. Tainio has determined that the average frequency of the human body during the daytime is 62-68 MHz. A healthy body frequency is 62-72 MHz . When the frequency drops, the immune system is compromised. Check out these very interesting findings:

Human Body:
Genius Brain Frequency 80-82 MHz
Brain Frequency Range 72-90 MHz
Normal Brain Frequency 72 MHz
Human Body 62-78 MHz
Human Body: from Neck up 72-78 MHz
Human Body: from Neck down 60-68 MHz Thyroid and Parathyroid glands are 62-68 MHz
Thymus Gland is 65-68 MHz
Heart is 67-70 MHz
Lungs are 58-65 MHz
Liver is 55-60 MHz
Pancreas is 60-80 MHz

Colds and Flu start at: 57-60 MHz
Disease starts at: 58 MHz
Candida overgrowth starts at: 55 MHz
Receptive to Epstein Barr at: 52 MHz
Receptive to Cancer at: 42 MHz
Death begins at: 25 MHz

Foods
(fresh foods and herbs can be higher if grown organically and eaten freshly picked):
Fresh Foods 20-27 Hz
Fresh Herbs 20-27 Hz
Dried Foods 15-22 Hz
Dried Herbs 15-22 Hz
Processed/Canned Food 0 HZ...(the majority of food we eat)
According to Dr. Royal R. Rife, every disease has a frequency. He found that certain frequencies can prevent the development of disease and that others would destroy disease. Substances with higher frequency will destroy diseases of a lower frequency. The study of frequencies raises an important question, concerning the frequencies of substances we eat, breathe and absorb. Many pollutants lower healthy frequency. Processed/canned food has a frequency of zero. Fresh produce has up to 15 Hz, dried herbs from 12 to 22 Hz and fresh herbs from 20 to 27 Hz.

Essential oils start at 52 Hz and go as high as 320 Hz, which is the frequency of rose oil. Clinical research shows that therapeutic grade essential oils have the highest frequency of any natural substance known to man, creating an environment in which disease, bacteria, virus, fungus, etc., cannot live.

American inventor Nikola Tesla (1856 – 1943), a pioneer of electrical technology, said that if you could eliminate certain outside frequencies that interfered in our bodies, we would have greater resistance toward disease.

Every essential oil has a frequency and each of our organs and body parts have a frequency. The frequency of an oil will attract a like frequency in the body. Lower frequencies become a sponge for negative energy. The frequency is what stays in the body to maintain the longer lasting effects of the oil. Low frequencies make physical changes in the body. Middle frequencies make emotional changes in the body. High frequencies make spiritual changes in the body. Spiritual frequencies range from 92 to 360 Hz. (Bone frequency is 38-43; neck and down frequency is 62-68).

Dr. Robert O. Becker M.D, in his book, The Body Electric, who also explains that a person's health can be determined by the frequency of the person's body.

Another doctor and scientist, whose research has been buried for some time but has managed to resurface due to the work of avid supporters, is Dr Royal Raymond Rife M.D, who developed a frequency generator in the late 1920's. In brief, Rife successfully treated 1,000 patients diagnosed with incurable cancer in the 1930's. He was honoured with 14 awards and an honorary doctorate.

After the unsuccessful attempt by pharmaceutical companies to buy out his research and equipment, his office was ransacked, his research paperwork was stolen and the machine that healed all those 1,000 "incurable" cancer patients was destroyed.

In 1934, before this destruction occurred, the University of Southern California appointed a Special Medical Research Committee to bring terminal cancer patients from Pasadena County Hospital to Rife's San Diego Laboratory and clinic for treatment. The team included doctors and pathologists assigned to examine the patients - if still alive - in 90 days. After the 90 days of treatment, the Committee concluded that 86.5% of the patients had been completely cured. The treatment was then adjusted and the remaining 13.5% of the patients also responded within the next four weeks. The total recovery rate using Rife's technology was 100%. http://www.rife.org/

What Rife had developed was a 100% effective cure for many forms of cancer. So why do we not know about this and why are there so many cancer research foundations in existence? Put simply, it is due to the economic motives of the orthodox medical community, which relies on funding for cancer research - such funding often coming from pharmaceutical companies - and whose fortunes would be damaged if a cure for cancer was found. (That is, it's OK to search for a cure but don't really find one!) This is a story that illustrates yet another grand attempt by the mainstream medical community to control the lives - and deaths - of so many millions of people today.

"In every culture and in every medical tradition before ours, healing was accomplished by moving energy." - Albert Szent-Gyorgyi, Nobel Laureate in Medicine (1937) What Rife proved is that every health disorder has a frequency, which in turn responds (resonates) to a specific (optimal) frequency for its dissolving/healing in the body.

People who maintain their optimal frequency, at least of their immune system, would prevent development of symptoms and illnesses associated with the common cold. Of course, in practise this does not work for most of us because, being human, we experience stress and emotional challenges on a daily basis, which lower our body frequency. Hence, we need to raise our body frequency regularly/daily with the right substances that are compatible at the cellular/energic level of our being, rather than wait until our body frequency has dropped so low that it becomes a friendly host for microscopic invaders.

How can we prove this?
According to a report (Epidemiology, May 2001; 11:345-349) psychological stress - particularly the chronic type that may accompany a personality with a negative outlook - is a risk factor for contracting colds. An optimistic outlook and outgoing personality seemed to protect individuals, investigators found. The findings indicate that high levels of psychological stress are closely associated with contracting the common cold. While the common cold is rarely a serious health hazard, it is responsible for about 30 million days of lost work in the U.S. alone each year. To investigate whether stress increased the likelihood of developing a cold, the researchers surveyed more than 1,100 Spanish university staff and students at regular intervals over a one year period. The study focused on different types of stress, including stress from life events, perceived stress, having a generally negative outlook, anxious or compulsive personality, compared with having a positive outlook/attitude to life.

Individuals with a negative outlook were at greatest risk of developing colds - regardless of their intake of vitamin C and zinc or their smoking and drinking habits. The next highest-risk individuals were those who believed that they were under stress. These people were nearly three times as likely to develop a cold, according to the report.

Why Should I Avoid An Antibiotic?
Colds can be contracted as the result of contact with more than 200 different viruses. However, among all of the

cold viruses, the rhinovirus and the coronavirus cause the majority of colds. Each time you have a cold, it is caused by a distinct virus (e.g. adenovirus, rhinovirus, parainfluenza virus, and coronavirus). Viruses are much smaller than bacteria. They are tiny clusters of genetic material surrounded by a protein 'wrapper'. Medical science currently does not have any drugs that can kill these viruses. Antibiotics, including penicillin, do not have any effect on viruses. They are only used to treat secondary bacterial infections that can further complicate the effects of a cold.

How Do We Actually Contract the Cold?
The most common source of infection is not from coughing or sneezing, or walking barefoot in the rain, but from hand-to-hand contact. That is why, when you have a cold, washing your hands frequently is very important. The likelihood of contracting the cold virus increases, however, if one is overtired and physically exhausted. Most uncomplicated colds last eight to nine days; about 25% last two weeks; and 5 -10% last three weeks.As long as one's temperature remains below 38.8 degrees Celsius, there is no need to lower it. Cold viruses do not reproduce at higher body temperatures. In fact, a slight fever should help us get rid of the virus quicker and feel better much sooner. It is our body's own way of ridding itself of toxins.Why are Aspirin and Tylenol counterproductive?A study (J Infect Dis, Dec 1990; 162(6):1277-82) showed that people who take aspirin and Tylenol (acetaminophen) suppress their body's ability to produce antibodies that destroy the cold virus. This actually causes the body to take longer to fight the cold and it accounts for any secondary infections and post-nasal drip.

What Can We Do to Avoid Common Cold?
While orthodox medicine does not have the answer for colds and 'flu, nature does - and it comes in the form of pure organic unadulterated Therapeutic Essential Oils. Why? Because they are made up of very high frequency molecules (ranging from 52MHz to 320MHz) and contain nature's wisdom and power to raise the body's frequency and to assist our immune system to fight viral invasions. For greater clarity, organic Therapeutic Essential Oils are not the same as everyday aromatherapy oils, which are produced for fragrant and other purposes.

Source: http://justalist.blogspot.com/2008/03/vibrational-frequency-list.html

Remark on Intelligent Design and Emergence Philosophy Approaches to Origin of the Universe

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Abstract

In recent years, there are many efforts by theologians to reconcile scientific description of the origin of the Universe with the Biblical account of Creation. In this paper, we will only remark on a few recent theories, i.e. Intelligent Design and Emergence Theory by Clayton/Yong. In the last section, we argue that beside the above two approaches, a new concept called *creatio ex-rotatione* offers a resolution to the long standing disputes between beginning and eternity of the Universe. In other words, in this respect we agree with Vaas, i.e. it can be shown: "how a conceptual and perhaps physical solution of the temporal aspect of Immanuel Kant's „*first antinomy of pure reason*" is possible, i.e. how our universe in some respect could have both a beginning and an eternal existence. Therefore, paradoxically, there might have been a time before time or a beginning of time in time." By the help of computational simulation, we also show how a model of early Universe with rotation can fit this new picture.

Keywords: Big Bang, Steady state, rotating universe, fluid, singularity-free, cosmology model, early Universe, Genesis, Spirit in Creation, spirit-filled medicine, mind-body-spirit medicine.

Two Approaches on the Origin of the Universe

In this short review, first we will discuss Intelligent Design's view on the Origin of the Universe, then we will discuss Emergence Philosophy.

a. Intelligent Design

Some theologians began with Psalm 19 to argue in favor of The Intelligent Creator:

The heavens declare the glory of God;
And the firmament shows His handiwork.
[2]Day unto day utters speech,
And night unto night reveals knowledge.
[3]*There is* no speech nor language

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Where their voice is not heard.
4 Their line[a] has gone out through all the earth,
And their words to the end of the world. *(Psalm 19: 1-4, NKJV)*[98]

We can note some proponents of ID, such as Michael Behe etc. While such attempt to link the old conception of Intelligent Design to Biblical account may sound interesting at first glance, one can note immediately that all ID proponents seem to avoid to point to God of Bible as the Intelligent Creator that they talk about.

Yes, ID theory is a nice hypothesis to talk about, but the end of the day, such a hesitation to speak about the Biblical God reflects their adherence (perhaps) to a number of theoretical possibilities which enable them to theorize around and around without daring to point at the Real Subject behind all Design in the Universe. And clearly, such a hesitation to point to God is not without implications, as Erkki Vesa Kojonen wrote in his dissertation in University of Helsinki [30]:

> "*ID's design arguments are quite minimalistic, not aspiring to prove the existence of God, but merely of an* **unidentified** *intelligent designer of cosmic and biological teleology.*"

At the price of giving too much "intellectual room," then we find in recent decades some scientists or pseudo-scientists come up with alternative hypothesis on who or what is behind the Design of the Universe:

- In their book "*Grand Design,*" Hawking and Mlodinow argue that in their TOE model based on certain variations of Superstring theories, that such TOE does need the role of God as Creator.[99] In other words, they seem to argue that physical laws exist eternally before the Universe exist, so by such physical laws themselves, there was Big Bang triggered by primordial vacuum fluctuations. But how did it happen…it seems many cosmologists remain silent on this vague hypothesis. This fact alone should alert us that Hawking and Mlodinow ask their readers to believe in a story based on a baseless-theory which does not conform to any experimental backup. See also article by Michael G. Strauss.[100] Moreover, other alerts may come from the fact that: It is worth noting, that calculation shows that Quantum Field theory predicts cosmological constant at

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[98] https://www.biblegateway.com/passage/?search=Psalm+19&version=NKJV
[99] https://www.reasonablefaith.org/writings/popular-writings/science-theology/the-grand-design-truth-or-fiction/
[100] http://www.michaelgstrauss.com/2017/08/the-grand-design-is-god-unnecessary.html

astronomical error compared to observed value.[101] Even mathematicians like Peter Woit already wrote a book called "*Not even wrong*" to alert us on the fact that Superstring theories do not predict anything which can be measured.[102] See also his other book: "*String theory: an evaluation*."[103]

- And much worse than Grand Design, some college students (and may be with support of their professors) have come up with a new god called "*Flying Spaghetti Monster*" (FSM religion). They even managed to push their case that FSM religion should be taught at high schools and colleges in the same way of ID/evolution theory.[104] Such a fancy FSM reminds us to the *golden cow* made by Aaron and the Israelites soon after Moses went to the mount.

b. Emergence Philosophy

According to Amos Yong, a full professor in Fuller Seminary:

> "To be clear, emergence is a philosophical or metaphysical hypothesis rather than a theological doctrine or scientific datum. Yet the theory of emergence, Clayton suggests, identifies patterns of developments in the natural history of the cosmos as understood through the findings of the various scientific disciplines. …" [6, p. 145]

In other words, emergence philosophy as proposed by Clayton[105] seems to be founded on certain metaphysical assumptions on how nature functions. We will not go into details of Emergence here, suffice it to say (with all respect to Amos Yong as a leading contemporary theological scholar from Fuller) that there is danger that we do **eisegesis** on biblical narratives, rather than doing a fair and faithful reading (exegesis) on Biblical account of Creation.

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[101] Quote from J.R. Roldan: "The quantum field *theory prediction* of the *cosmological constant* is 120 orders of magnitude higher than the observed value. This is known as the *cosmological constant problem*." https://arxiv.org/abs/1011.5708

[102] http://www.math.columbia.edu/~woit/rutgers.pdf

[103] https://www.math.columbia.edu/~woit/strings.pdf

[104] https://www.telegraph.co.uk/news/worldnews/northamerica/usa/1498162/In-the-beginning-there-was-the-Flying-Spaghetti-Monster.html

[105] http://philipclayton.net/files/papers/EmergenceOfSpirit.pdf

Therefore in the next section we shall show what we can infer from Biblical narratives, with minimal assumptions, i.e. using hermeneutics of Sherlock Holmes.

How *creatio ex-rotatione* may Resolve Dispute on the Origin of the Universe through re-reading Gen. 1:1-2

1. Introduction

In recent years, the Big Bang as described by the Lambda CDM-Standard Model Cosmology has become widely accepted by majority of physics and cosmology communities. But the philosophical problems remain, as Vaas pointed out: Did the universe have a beginning or does it exist forever, i.e. is it eternal at least in relation to the past? This fundamental question was a main topic in ancient philosophy of nature and the Middle Ages. Philosophically it was more or less banished then by Immanuel Kant's *Critique of Pure Reason*. But it used to have and still has its revival in modern physical cosmology both in the controversy between the big bang and steady state models some decades ago and in the contemporary attempts to explain the big bang within a quantum cosmological framework.

Interestingly, Vaas also noted that Immanuel Kant, in his *Critique of Pure Reason* (1781/1787), argued that it is possible to prove both that the world has a beginning and that it is eternal (first antinomy of pure reason, A426f/B454f). As Kant believed he could overcome this „self-contradiction of reason" („*Widerspruch der Vernunft mit ihr selbst*", A740) by what he called „*transcendental idealism*", the question whether the cosmos exists forever or not has almost vanished in philosophical discussions. [3]

In this paper we will take a closer look at Genesis 1:2 to see whether the widely-accepted notion of *creation ex-nihilo* is supported by Hebrew Bible or not. It turns out that a new concept called **creatio ex-rotatione** is in agreement with Kant and Vaas's position, it offers a resolution to the long standing disputes between beginning and eternity of the Universe. In other words, in this respect we agree with Vaas: "how a conceptual and perhaps physical solution of the temporal aspect of Immanuel Kant's „*first antinomy of pure reason*" is possible, i.e. how our universe in some respect could have both a beginning and an eternal existence. Therefore, paradoxically, there might have been a time before time or a beginning of time in time."[3]

2. Preliminary remark on Hermeneutics of Sherlock Holmes

In the preceding section, we have discussed on how our proposed term of "*creatio ex-rotatione*" has sufficient logical background.

In the subsequent section we will discuss how to answer this question by the lens of hermeneutics of Sherlock Holmes. This is a tool of mind which we think to be a better way compared to critical hermeneutics.

- What is *Hermeneutics of Sherlock Holmes*?[106]

- The following are 10 tips from Eric McKiddie to adapt Sherlock Holmes to interpreting biblical passages:[107]
  - Tip no 1:

  Holmes: "I have no data yet. It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts."

    Far too often students of the Bible (and cosmology folks as well) twist verses to suit interpretations instead of formulating interpretations to suit what the verses say.

  Guide: Don't approach your passage assuming you know what it means. Rather, use the data in the passage – the words that are used and how they fit together – to point you toward the correct interpretation.

  - Tip no 2: **The kind of looking that solves mysteries.**

- *Holmes: "You have frequently seen the steps which lead up from the hall to this room."*
- *Watson: "Hundreds of times."*
- *Holmes: "Then how many are there?"*
- *Watson: "How many? I don't know!"*
- *Holmes: "Quite so! You have not observed. And yet you have seen. That is just my point. Now, I know that there are seventeen steps, because I have both seen and observed."*

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[106] https://www.str.org/blog/learning-hermeneutics-from-holmes

[107] https://www.thegospelcoalition.org/blogs/trevin-wax/10-tips-on-solving-mysterious-bible-passages-from-sherlock-holmes/

- There is a difference between reading a Bible verse and observing it. Observation is a way of collecting details contained in a passage. As you read and reread the verses, pull the words into your brain where you can think about them and figure them out.
- This habit will shed light on how you understand the text, even if the passage is as familiar as the stairs in your house.

  - ○ Tip no 3: **Know what to look for.**

- *Watson: "You appeared to [see] what was quite invisible to me."*

- *Holmes: "Not invisible but unnoticed, Watson. You did not know where to look, and so you missed all that was important."*

- Know where to look for clues that will illuminate your passage. Look for repeated words and phrases, bookends (where the beginning and end of the passage contain similarities), and clues in the context around your passage.

- Don't know what to look for? *Living by the Book* by Howard Hendricks and *How to Read the Bible for All Its Worth* by Gordon Fee and Douglas Stuart are great resources to start learning how to study the Bible.

  - ○ Tip no 4: **Mundane details are important!**

- *Watson: "I had expected to see Sherlock Holmes impatient under this rambling and inconsequential narrative, but, on the contrary, he had listened with the greatest concentration of attention."*
- Don't ignore parts of the passage that seem insignificant to its meaning. Treat every word as if it contains clues to the interpretation of the passage.

  - ○ Tip no 5: **Use solutions to little mysteries to solve bigger ones.**

- *Holmes: "The ideal reasoner would, when he had once been shown a single fact in all its bearings, deduce from it not only all the chain of events which led up to it but also all the results which would follow from it."*
- Once you understand the passage that baffled you, your work is not done!
- Now it's time to locate that passage in the grand narrative of the Bible. How do previous books and stories lead up to your passage? How does your passage anticipate the consummation of all things that results at Jesus' second coming?

  - ○ Tip no 6: **The harder the mystery, the more evidence you need.**

- *"This is a very deep business," Holmes said at last. "There are a thousand details which I should desire to know before I decide upon our course of action."*

- In grad school, one professor gave us an assignment requiring us students to make 75 observations on Acts 1:8. The verse does not even contain that many words!

- The professor's goal was to train us in compiling evidence. Harder Bible passages demand that we collect as much information as possible.

  o Tip no 7: **Break big mysteries down into little ones.**

- *Watson: "Holmes walked slowly round and examined each and all of [the pieces of evidence] with the keenest interest."*
- Difficult passages can be overwhelming. Break chapters down into paragraphs, paragraphs into verses, and verses into clauses. Devote careful attention to each chunk of the passage individually. Then try to piece together the meaning they have when added up as a whole.

  o Tip no 8: **Don't be so committed to a solution that you ignore new evidence.**

- *"I had," said Holmes, "come to an entirely erroneous conclusion which shows, my dear Watson, how dangerous it always is to reason from insufficient data…I can only claim the merit that I instantly reconsidered my position."*
- After you've put the hard work into grasping a mysterious passage, the case isn't necessarily closed. Often you'll run across other passages that shed new light on your passage. Or you'll hear someone preach those verses in a different way than how you interpreted it.
- Always be willing to consider new insights. This will at least help you nuance your understanding of the passage, if not take a different stance.

  o Tip no 9: **Simple solutions often provide answers to manifold mysteries.**

- *Holmes: "The case has been an interesting one…because it serves to show very clearly how simple the explanation may be of an affair which at first sight seems to be almost inexplicable."*
- Many passages that seem mysterious at first end up not being so bad. Their bark is worse than their bite. For example, several passages in Revelation, intimidating to so many, have simple explanations. (Not all, but some!)

  o Tip no 10: **On the other hand, so-called simple passages may be more complicated than initially meets the eye.**

- *Holmes: "This matter really strikes very much deeper than either you or the police were at first inclined to think. It appeared to you to be a simple case; to me it seems exceedingly complex."*
- This is often true of coffee mug and bumper sticker verses. We think they are simple to understand because we see them all the time. But once you dig into them, you realize they are more mysterious than meets the eye.

3. A close reading at Genesis 1:1-2 and implications

One of the biggest mysteries in cosmogony and cosmology studies is perhaps: *How to interpret properly Genesis chapter 1:2*. Traditionally, philosophers proposed that God created the Universe out of nothingness (from reading "empty and formless" and "*bara*" words; this contention is called "*creatio ex nihilo*."). Understandably, such a model can lead to various interpretations, including the notorious "cosmic egg" (primeval atom) model as suggested by Georges Lemaitre, which then led to Big Bang model.[18-20] Subsequently, many cosmologists accept it without asking, that Big Bang stands as the most faithful and nearest theory to Biblical account of creation. But we can ask: Is that primeval atom model the true and faithful reading of Genesis 1:2?

Let us start our discussion with examining key biblical words of Hebrew Bible, especially Genesis 1:1-2. It can be shown that the widely accepted creation ex nihilo is a *post-biblical invention*, rather than as faithful reading of the verses. To quote Ian Barbour: "*Creation out of nothing is not a biblical concept*."[4]

Let us consider some biblical passages:

- The literal meaning of Gen. 1:1, "bareishit bara Elohim." This very first statement of the book of Genesis literally reads: 'first' and 'beginning' are reasonable alternatives for the Hebrew noun, *reishit*. Also note that in Hebrew, subjects and verbs are usually ordered verb-first (unlike English in which the subject is written first). If the verb and subject of this verse are reordered according to natural English grammar we read: [1]
  {In, When} {first, beginning} Elohim created…
  reishit: The noun, reishit, has as its root the letters, ראש (Resh -Aleph-Shin). Words derived from this root often carry the meaning of 'primary', 'chief', 'begin', 'first' or "first-in-line", "head of", and so forth. Harris's Theological Wordbook of the Old Testament (TWOT) is more specific, namely, reishit means[1]

  > "…first, beginning, choicest, first or best of a group. [Reishit is] a feminine noun derived from the root [Resh-Aleph-Shin], it appears fifty times in nearly all parts of the [Old Testament]. [Its] primary meaning is "first" or "beginning" of a series."

  Accordingly, we can now retranslate *bəreishit bara Elohim* as "When first created Elohim", or as we would render in English,[1]

  When Elohim first created…

- Gen. 1:2, "And the earth had been." In English this is easily handled by the past perfect tense (also called the pluperfect or the "flashback" tense). Likewise, if *haytah* in v 1:2 is translated as a past perfect verb, then verses 1:1-2 would read,[1]

  When Elohim first created the heavens and the earth, the earth had been …

  In this translation the universe, in some form or other, was already in existence when God executed His first creative act, the creation of light.

- A re-reading of Gen. 2:7 with Hermeneutics of Sherlock Holmes[108]

  If we glance at Gen. 2: 7, we see at a glance that man is made up of the dust of the ground (*adamah*) which is breathed by the breath of life by God (*nephesh*). Here we can ask, does this text really support the Cartesian dualism view?
  We do not think so, because the Hebrew concept of man and life is integral. The bottom line: it is not the spirit trapped in the body (Platonic), but the body is flowing in the ocean of spirit.

- Let's look at three more texts:

  a. Gen. 1: 2, "*The earth is without form and void, darkness over the deep, and the Spirit of God hovering over the waters.*" Patterns such as Adam's creation can also be encountered in the creation story of the universe. Earth and the oceans already exist (similar to *adamah*), but still empty and formless. Then the Spirit of God hovered over it, in the original text "*ruach*" can be interpreted as a strong wind (storm). So we can imagine there is wind/hurricane, then in the storm that God said, and there was the creation of the universe. See also Amos Yong [6], also Hildebrandt [15]. From a scientific point of view, it is well known in aerodynamics that turbulence can cause sound (*turbulence-generated sound*). And primordial sound waves are indeed observed by astronomers.
  b. Ps. 107: 25, "*He said, he raised up a storm that lifted up his waves.*" The relation between the word (sound) and the storm (turbulence) is interactive. Which one can cause other. That is, God can speak and then storms, or the Spirit of God causes a storm. Then came the voice.
  c. Ezekiel. 37: 7, "*Then I prophesy as I am commanded, and as soon as I prophesy, it sounds, indeed, a crackling sound, and the bones meet with one another.*" In Ezekiel it appears that the story of the creation of Adam is repeated, that the Spirit of God is blowing (storm), then the sound of the dead bones arises.

The conclusion of the three verses above seems to be that man is made up of *adamah* which is animated by the breath or Spirit of God. He is not matter, more accurately referred to as spirit in matter.

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[108] Check Eric McKiddie's article: https://www.thegospelcoalition.org/blogs/trevin-wax/10-tips-on-solving-mysterious-bible-passages-from-sherlock-holmes/

In other words, a close reading of Hebrew Bible seems to suggest that *creatio ex-nihilo* is a post-biblical invention. Other scholars have suggested an alternative concept, called *creatio ex-materia,* but many orthodox Christian scholars have raised objection to this notion, partly because the term seems to undermine God's ultimate power and control of the Universe. Besides, the notion of *creatio ex-materia* has been advocated by Mormon preachers.

To overcome this problem, and based on what we learned recently, allow us now to come up with a new term: **creatio ex-rotatione** (rotatione is a Latin word for "rotation)". As we shall see in the next chapter, it is possible to come up with a physical model of early Universe with rotation, where the raw materials have been existed for long period of time, but suddenly it burst out into creation. And it seems to fit with Kant's idea to resolve the dichotomy between finite past or eternal Universe. Furthermore, it can be shown that the model naturally leads to accelerated expansion, without having to invoke *ad hoc* assumptions like dark energy or cosmological constant.

4. A computational model of rotation in early Universe

Our discussion starts from the fundamental question: how can we include the rotation in early Universe model? After answering that question, we will discuss how "turbulence-generated sound" can be put into a mathematical model for the early Universe. We are aware that the notion of turbulence-generated sound is not new term at all especially in aerodynamics, but the term is rarely used in cosmology until now. We shall show that 3D Navier-Stokes will lead to non-linear acoustics models, which means that a turbulence/storm can generate sound wave.

It has been known for long time that most of the existing cosmology models have singularity problem. Cosmological singularity has been a consequence of excessive symmetry of flow, such as "Hubble's law". More realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe.

In other paper, we obtained an Ermakov-type equation following Nurgaliev [8]. Then we solve it numerically using Mathematica 11. An interesting result from that simple computational simulation is shown in the following diagram:[9]
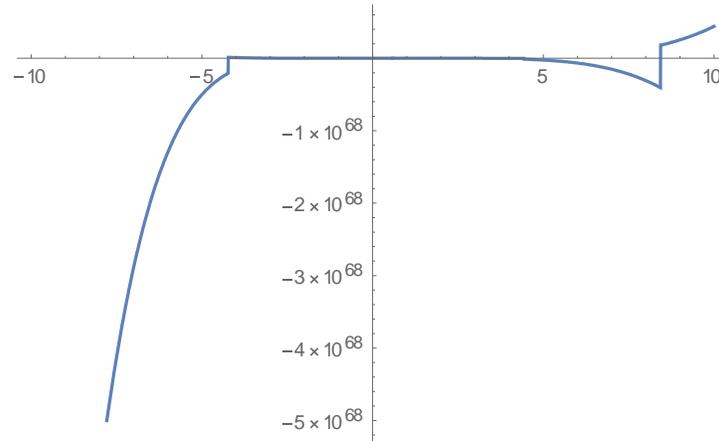
Diagram 1. Plot of Ermakov-type solution for A=1, B=-10 (from [9])

From the above computational experiment, we conclude that the evolution of the Universe depends on the constants involved, especially on the rotational-vortex structure of the Universe. This needs to be investigated in more detailed for sure.

One conclusion that we may derive especially from Diagram 1, is that our computational simulation suggests that it is possible to consider that the Universe has existed for long time in prolonged stagnation period, then suddenly it burst out from *empty and formless* (Gen. 1:2), to take its current shape with observed "accelerated expansion."

As an implication, we may arrive at a precise model of flattening velocity of galaxies without having to invoke *ad-hoc* assumptions such as dark matter.

Therefore, it is perhaps noteworthy to discuss briefly a simple model of galaxies based on a postulate of turbulence vortices which govern the galaxy dynamics. The result of Vatistas' model equation can yield prediction which is close to observation, as shown in the following diagram:[14]
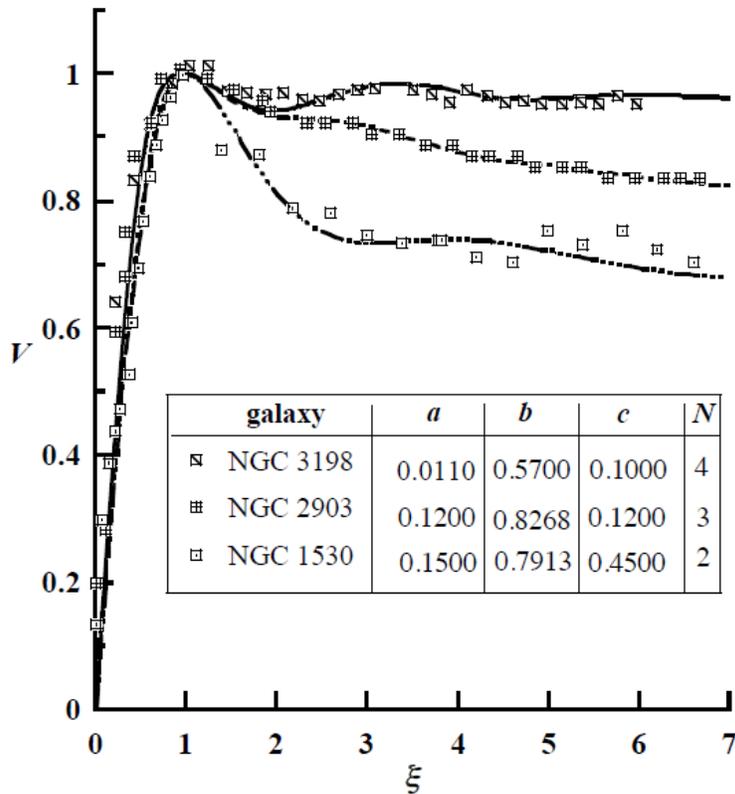
Figure 1. From Vatistas [14]

Therefore, it appears possible to model galaxies without invoking numerous *ad hoc* assumptions such as *dark matter*, once we accept the existence of turbulent interstellar medium. The Vatistas model is also governed by Navier-Stokes equations, see for instance [14].

5. Advantages of "creatio ex-rotatione" concept

In the preceding section, we have discussed on how our proposed term of "*creatio ex-rotatione*" has sufficient logical background.

Now, allow us to discuss some advantages of the proposed "*creatio ex-rotatione*" cosmology view over the Lemaitre's primeval atom (which is the basis of Standard Model Cosmology).

a. Explain excess of handedness in spiral galaxies

As reported by Longo et al, there is an excess of left-handedness in spiral galaxies. According to Longo, the simplest explanation of such left-handedness is that there is net

angular momentum of the Universe. This seems to suggest that our hypothesis of *creatio ex-rotatione* is closer to the truth with respect to origin of the Universe. [2]

See also the Appendix section.

b. Avoid inflationary scheme.

It is known that inflationary models were proposed by Alan Guth et al. (see [25][26]), in order to explain certain difficulties in the Big Bang scenario. But some cosmology experts such as Hollands & Wald has raised some difficulties with inflationary model, as follows:

> "*We argue that the explanations provided by inflation for the homogeneity, isotropy, and flatness of our universe are not satisfactory, and that a proper explanation of these features will require a much deeper understanding of the initial state of our universe.*"[27]

In our diagram plot above, it is clear that an early rotation model can explain why the Universe can burst out into creation in a very short period, without invoking ad hoc postulate such as inflation model.

c. Explain accelerated expansion.

As far as we know, one of the earliest models which gave prediction of accelerated expanding Universe is Carmeli's Cosmological General Relativity.[29]

But it has been shown by Green & Wald that for the large scale structures of the Universe, Newtonian model can give similar results compared to general relativity picture.[28]

Furthermore, it seems that there is no quite clear arguments why we should accept Carmeli use of 5D metric model (space-time-velocity metric). In the meantime, in our rotating Universe model, we do not invoke ad hoc dimension into the metric.

d. Explain inhomogeneity, breeding galaxies etc.

Astronomers have known for long time, that the Universe is not homogeneous and isotropic as in the usual model. It contains of inhomogeneity, irregularity, clumpiness, voids, filaments etc, which indicate complex structures. Such inhomogeneous structures may be better modelled in terms of turbulence model such as Navier-Stokes equations, see also our early papers [11][12].

Furthermore, observations clearly suggest that matter ejected continuously in galaxy centers, which view is difficult to reconcile with Big Bang scenario of galaxy creation.

Concluding Remarks

In this paper we argue that the proposed *creatio ex-rotatione* offers a resolution to the long standing disputes between beginning and eternity of the Universe. In other words, in this respect we agree with Vaas, i.e. it can be shown: "how a conceptual and perhaps physical solution of the temporal aspect of Immanuel Kant's „*first antinomy of pure reason*" is possible, i.e. how our universe in some respect could have both a beginning and an eternal existence. Therefore, paradoxically, there might have been a time before time or a beginning of time in time."

We argue that a close re-reading of Genesis 1:2 will lead us to another viable story which is different from Lemaitre's primeval atom model of early Universe, albeit this alternative has not been developed rigorously as LCDM theories.

By the help of computational simulation, we also show how a model of early Universe with rotation can fit this new picture. And one conclusion that we may derive especially from Diagram 1, is that it is possible to consider that the Universe has existed for long time in prolonged stagnation period, then suddenly it burst out from *empty and formless (Gen. 1:2)*, to take its current shape with accelerated expansion. Such a possibility has never been considered before in cosmology literatures.

It is our hope that our exploration will lead to more realistic nonlinear cosmology theories which are better in terms of observations, and also more faithful to Biblical account of creation.

We hope this short review may inspire younger generation of physicists and biologists to rethink and renew their approaches to Nature, and perhaps it may also help to generate new theories which will be useful for a better future of mankind.

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VC

This book took an unconventional theme because we submit an unorthodox theme too.

Karl Popper's epistemology suggests that when the theory is refuted by observation, then it is time to look for a set of new approaches. In the first chapter, it is shown that Hilbert's axiomatic program has failed not only by experiment (Mie theory does not agree with experiment) but also in terms of logic (Gödel theorem). Therefore we set out a new approach, starting from an old theory of Isaac Newton.

Dilbert cartoon series often offer surprises for old problems, especially in this era of *corporatocracy*. Now we would call such an out-of-the-box solution to the old Hilbert axiomatic program as Dilbert way (or *Dilbertian*, if you wish).

Readers may ask : but what can physicists learn from Dilbert cartoons?

While it seems not obvious at first glance, yes we believe there is a great character of Dilbert cartoon, i.e. to put it in one phrase: "*out-of-the-box and brutally honest.*"

From managers who tend to criticize other folks, only to make him/her looks smart. Or people who often send "FYI emails" only to make him/her looks managing well.

We do think that such a brutal honesty is also needed in many fields of physics: from theoretical physics to applied physics, as will be discussed throughout this book.

Enjoy reading, buddy.

4th December 2018
VC & FS