Notes on Spacetime Engineering

D. Chakalov
Notes on Spacetime Engineering

D. Chakalov
dchakalov@gmail.com
chakalov.net
September 24, 2021

Abstract

Brief and biased notes on spacetime engineering, for open-minded people with little knowledge in physics and math. For details, RDFM\textsuperscript{1}.

1. Introduction

Many years ago, I read a fascinating crime novel by Agatha Christie. It was about a noble (also very rich) owner of an old mansion in England (probably in Cambridgeshire), who was brutally murdered at his 50th birthday party. I suspected the killer was either the old butler or the gardener, as they looked very suspicious to me. But I was wrong. As Hercule Poirot explained at the end, the killer was the maid — a young and pretty lady, who was actually the illegitimate daughter of the noble owner of the mansion (he apparently knew nothing about her), after a brief spell he had many years ago with her mother (also a noble but very poor lady), who happened to be his second cousin. So, the young pretty maid was seeking revenge. Now it was all obvious, but I had to read the entire novel to connect the dots at the very last page.

This is an example of how not to write about complicated issues, such as the spacetime of the Universe and the physics\textsuperscript{1} of the human brain.
The reader should know the crux of spacetime engineering right from the start (Fig. 1): swing the “carrot” (potential future) toward your desired destination, and the donkey will carry you and the cart there. Notice the Law of Reversed Effort: “To the mind that is still, the whole universe surrenders” (Lao Tzu).

![Fig. 1](image)

The main task is to develop feedback from the matrix (Ch. 2) shown as “carrot”: follow the Law of Reversed Effort. There is no physical interaction between you and the matrix — you may only notice that your ability to perform self-action has increased. It is not like Baron Munchausen. Where does the self-energy come from?

In the next chapter, I will highlight some of the new concepts above and will explain them like a Husserlian noema — an indefinite whole, which becomes gradually filled with concrete content. In Ch. 3, I will explain the ‘engine’ of spacetime engineering — the arrow of Time depicted in the left (vertical) section of Fig. 2 below. In Ch. 4, I will elaborate on the matter-psyche relations (after Gottfried Leibniz) shown in the upper (horizontal) section of Fig. 2. Needless to say, I will have to introduce many more ideas, which also require explanation.

As Friedrich Schiller famously noted, only the fullness leads to clarity, and the truth dwells into the abyss (Nur die Fülle führt zur Klarheit, und im Abgrund wohnt die Wahrheit).

2. What is spacetime engineering?
Spacetime engineering studies and explores our ability to change the state of a physical system (e.g., the human body) by changing its next future states through the ‘carrot’ in Fig. 1 viz. Res potentia in Fig. 2. Notice the total absence of “windows” toward Res potentia below: “The monads have no windows through which something can enter or leave.” (Leibniz, Monadology §7.) Thus, Res potentia is not directly accessible, not even with thought experiments. Read the doctrine of trialism at p. 3 in The Physics of Life. It resembles the wave-particle duality in quantum mechanics, in the sense that the intact quantum state (p. 4 in The Physics of Life) is not directly observable either.

Fig. 2. See Fig. E and Fig. 5 in The Physics of Life.

Now, the spacetime is modeled with geometry. Not with some physical field, which has energy and can perform work. There is no ‘geometric energy’ that can spring from ‘pure geometry’, namely, from the bare grin of the Cheshire cat, without the cat (Fig. 3). The second puzzle is that there is no ‘potential future’ in the current models of spacetime, and hence no dynamics of the spacetime itself.
Theoretical physicists picture the world as a dead frozen block of matter: “There is no dynamics within spacetime itself: nothing ever moves therein; nothing happens; nothing changes.” If true, how can the spacetime — the grin of the Cheshire cat without the cat (Fig. 3) — ‘talk back’ to matter? If it can, it must be a brand new physical field.

Fig. 3. Symbolic presentation of Einstein’s equations.

In 1976, Hans Ohanian wrote: “matter (the Cheshire cat - D.C.) acts on the gravitational field (changes the fields), but there is no mutual action of gravitational fields on matter; that is, the gravitational field (the grin of the cat without the cat - D.C.) can acquire energy-momentum from matter, but nevertheless the energy-momentum of matter is conserved (\(\partial_\nu T^{\mu\nu} = 0\)). This is an inconsistency.” I think it is more than “inconsistency”. It is sheer parapsychology, like saying ‘abracadabra — voila!’ Read Matt Visser and pp. 22 ff.

As Zhao-Yan Wu rigorously demonstrated, “there is no spring or sink everywhere in spacetime for matter energy-momentum, therefore gravitational field does not exchange energy-momentum with both electromagnetic field and particles (charged and uncharged). Hence it does not carry energy-momentum. Gravitational field is not a force field, and gravity is not a natural force.” Read Albert Einstein.
Can we make gravity a natural force\textsuperscript{6,9}? Yes we can, but the solution is counter-intuitive: we introduce a Platonic state of the entire Universe as ONE, called here Res potentia (Fig. 2), which is the source of both geometry and matter. It (not “He”) is their common cause\textsuperscript{8} accessible via Res potentia (Fig. 2) viz. via the carrot in Fig. 1. Now, replace the carrot with the so-called matrix (p. 4 and p. 6 in *The Physics of Life*\textsuperscript{1}).

Think of the matrix as a virtual pool of infinitely many instructions of the type ‘if $P$, then $Q$’, which create and sustain all living organisms and quantum-gravitational systems (p. 19 in *Quantum of Spacetime*\textsuperscript{1}), such as the brain, the protons and photons, and the 4D physical world.

**NB:** Spacetime engineering works by tweaking the Platonic matrix placed in the potential future (Fig. 4): see Fig. 4 in *The Physics of Life*\textsuperscript{1}. It is the blueprint of the arrow of Time\textsuperscript{11}.

The matrix is nether matter nor psyche. It is the pre-geometric Res potentia (Fig. 2): a Platonic form of reality, “just in the middle between possibility and reality” (Werner Heisenberg\textsuperscript{10}). There is no metric in the matrix. It is exactly nullified in the physical 4D world: see Fig. 10 and pp. 9-10 in *The Physics of Life*\textsuperscript{1}. The matrix inhabits
only the potential future of the Heraclitean arrow of Time\textsuperscript{11}, hence it cannot be observed with light. But it is not some “mystery matter”.

Forget “dark energy” and “dark matter”. GR is essentially incomplete (Fig. 3). Are the Earth tides\textsuperscript{9} caused by some mythical “dark energy”?

Now we have to dive into the abyss: the arrow of Time\textsuperscript{11}. With light, we can see only the irreversible past, e.g., the state of the Sun 500 sec ago (p. 4 in Time.pdf). What if Time is perfectly hidden by light?

3. The arrow of Time

The Heraclitean arrow of Time\textsuperscript{11} is not relational phenomenon: there is no ‘absolute space’, like the river banks at absolute rest, with respect to which we could define the ‘flow of water’\textsuperscript{11}. We cannot define the rate of Time\textsuperscript{13,14} either — ‘one second per second’ makes no sense. We cannot observe with light the elementary transitions of Time (Fig. 7), “separating” the potential future from the past (Fig. 4), either. Matter and fields have positive energy density, and they live only in the past.

On 21 September 2008\textsuperscript{16}, commemorating Hermann Minkowski’s Raum und Zeit (21 September 1908), I suggested two modes of spacetime: local (physical) mode, and global (Platonic) mode. The local mode is what physicists call ‘time as read with a clock’. This local time is from ‘change in space’, such as the coordinate time, whereas the global (Platonic) mode of spacetime pertains to ‘change of space’\textsuperscript{16}. Every 4D point/event in spacetime is endowed with the two modes (Side 2), but the elementary ‘change of space’ (Slide 1) is unobservable with light\textsuperscript{18}. 
Why is this important? Because of the indisputable blueprints of the
global (Platonic) mode of the entire Universe as ONE, embedded in the
local (physical) mode\textsuperscript{17}, like a Platonic hand perfectly embedded in its
4D glove (p. 5 in \textit{Quantum of Spacetime}\textsuperscript{1}). Don’t trust GR textbooks.

\textbf{NB:} The Platonic hand makes the ‘4D glove’ self-acting (Fig. 1). Any
effort to derive the self-action of gravity from physical fields leads to
fictitious “dark energy” and “black holes”. Check out the so-called
evolution equation at p. 28 (last) in \textit{The Physics of Life}\textsuperscript{1}. Bottom line
is to move at pre-geometric level and split (Fig. 4) the geometric point
‘here and now’\textsuperscript{18}, in order to “insert” the atemporal ‘change of space’
mentioned above. Complicated? Let’s go to the “speed” of light\textsuperscript{18}.

Suppose you are tossing a ball toward a wall and are monitoring ball’s
trajectory. You have recorded four consecutive instantaneous states of
the ball, at which it has come back to you (Fig. 5).

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{ball_trajectory.png}
\caption{Fig. 5. See Fig. E and Fig. 11 at p. 12 in \textit{The Physics of Life}\textsuperscript{1}.}
\end{figure}

But if you are shooting a photon toward a mirror, you will see only a
perfectly continual trajectory of four photons (Fig. 5). You can never
see the photons going toward the mirror, bouncing back, and hitting
your eyes. With light\textsuperscript{18}, we see the physical world only post factum,
and only once-at-a-time, as recorder with a clock (local mode). With
light, we cannot see the so-called negative mass\textsuperscript{15}, dubbed Macavity\textsuperscript{19}. No region $\Delta t$ of “total negative energy” (Adam Helfer\textsuperscript{19}) can live on the light cone. In summary, the phenomena of causality and locality are indissolubly linked to the \textit{perfect continuum} of Time\textsuperscript{11,13}. Check out again the so-called evolution equation (p. \textit{28} in \textit{The Physics of Life}\textsuperscript{1}), driven by the self-energy of the Unmoved Mover\textsuperscript{21} — the Final Cause.

Everything said above pertains to the question of how to bind \textbf{matter to matter} with the ‘engine’ of spacetime engineering — the arrow of Time depicted in the left (vertical) section of Fig. 2. The next question is how to bind \textit{mind} to matter, depicted with the upper (horizontal) section of Fig. 2: the doctrine of \textit{trialism} (p. 3 in \textit{The Physics of Life}\textsuperscript{1}).

\textbf{4. How to bind mind to matter?}

Thirty-two years ago, in January 1990\textsuperscript{20}, the task was looking doable. Not anymore\textsuperscript{22}. Why making these efforts? A friend of mine\textsuperscript{18} asked recently whether he could learn spacetime engineering without the hassle of reading “your crazy stuff”. Suppose you wish to learn how to juggle three balls: watch the manual at \textit{YouTube}. However, suppose you cannot see the balls, and actually have three spoons at your disposal. You only believe that you’re dealing with balls, but they are in facts spoons. Then suppose you believe that you will be tossing balls (not spoons) in the air, but you have feedback from your legs only, because you are blindfolded and can’t see anything. You try to move your arms and toss the balls in the air, but in fact you’re moving your legs and kicking the three spoons on the floor. What skill could you learn without that “crazy stuff”? Try meditating on a rock instead.
Let me explain the \textbf{matrix above}. Suppose you are slicing onion with a kitchen knife and accidentally cut your finger: you put a plaster on it to heal faster and on the next day your skin will recover completely. Trivial, you may say, but recall that there is no custom-made software application, which can be inserted in every \textit{skin cell} to execute such process, \textit{just in case} you cut your finger\textsuperscript{22}. This is how the biological \textbf{matrix} works. The second quantum-gravitational \textbf{matrix} is even more effective, as it creates the \textit{protons and photons}, and the 4D \textbf{physical world}. Last but not least, the \textit{brain} has access to the third cognitive \textbf{matrix}, as demonstrated with the experiment below.

Imagine a cube made of some white plastic material, with 3 cm rib, painted blue, which you cut into 27 little cubes, 1 cm each, and ask yourself the question: how many little cubes have 3 painted sides, 2, 1, and zero?

Compare this exercise to the demonstration by \textbf{Flavian Glont}, who can arrange approximately 43 quintillion (43.10\textsuperscript{30}) permutations of the Rubik Cube blindfolded: watch 6:33 to 6:38 at YouTube (Fig. 6) and noticed that at the end he was “looking” at cube’s cognitive \textbf{matrix} for nearly 2 sec. What was he “looking” at? Read my mind☺.
Now you have to apply the doctrine of trialism (p. 3 in *The Physics of Life*) to *merge* all types of matrixes, and use your brain to practice spacetime engineering (Ch. 2). It works better than a Swiss watch, but perhaps it will be more difficult than learning to *juggle three balls*. As Henry Ford famously noted, whether you believe you can do a thing or believe you can’t, you are right. The corollary in German: *Die beste Art die Zukunft vorauszusagen ist, sie selbst zu erschaffen.* Good luck.

5. Criticism

As stated in the abstract, my notes are *biased*. The best I can do is to examine critically every piece of the theory and try to prove it wrong, or at least redundant. I will list here my efforts to demolish my theory. The reason is very simple. Every theory is like a map that is supposed to pinpoint the location of a hidden treasure. Any error, no matter how small, in the map can make it unusable to find the treasure. It will be like ‘kicking spoons on the floor’ above. I don’t care at all about my ‘map’. It is just a tool. You will be the judge. Read also Ch. 7 below.

Let me start with criticizing the arrow of Time in Nature, and then I will focus on its presentation in my ‘map’: the left (vertical) section of Fig. 2. Later, I will critically examine the upper (horizontal) section of Fig. 2 (the doctrine of trialism, p. 3 in *The Physics of Life*). Hopefully, this can make my ‘map’ falsifiable, to some extent at least.

5.1. The arrow of Time is *not* physical phenomenon. In physics, one can only suggest *global hyperbolicity* from the ‘block universe’ (p. 4).
5.1.1. Agree. The arrow of Time is not *physical* phenomenon, because it cannot be a *relational* phenomenon. Otherwise the river banks\textsuperscript{11} at “absolute rest” could be detected with light and the *Ether* will become physical stuff providing *absolute coordinates*, which will demolish the Theory of Relativity. See Fig. 14 at p. 15 in *The Physics of Life*\textsuperscript{1}.

5.2. The arrow of Time, shown in the left (vertical) section of Fig. 2, is not backed by *physical* evidence.

5.2.1. See 5.1.1. The arrow of Time is empowered by the *self-energy* of the Unmoved Mover\textsuperscript{21} — the *Final Cause*. This is the *fifth force*. Let me zoom on the elementary step (a.k.a. *chronon*) of ‘change of space’ mentioned in Ch. 3: the *quantum of spacetime*. Is it *falsifiable*?

First, a thought experiment. Fig. 7 shows two of the *photons* in Fig. 5.

Fig. 7. Adapted from Fig. K on p. 21 in *Quantum of Spacetime*\textsuperscript{1}.

Your good old clock reads \((t_2 - t_1 > 0)\) as the *infinitesimal* (\(\varepsilon\)) temporal interval along the *local* (physical) time mentioned in Ch. 3. Your clock
cannot read the “vertical” shift in Fig. 7 viz. the dark strips in Fig. 5, separating the consecutive snapshots from the movie reel. In ADM hypothesis, however, the “vertical” shift in Fig. 7 above is part and parcel from the spacetime (Fig. 8).

In addition to the two variables $\gamma_{ij}$ and $\pi_{ij}$, there are two Lagrange multipliers called the lapse $N$ and shift $N_t$.

These describe how each of the "leaves" $\Sigma$, of the foliation of spacetime are welded together.

In Fig. 8, the “leaves” (shown with balls in Fig. 5) are welded together by themselves. In Fig. 7, the two “leaves” are welded together in a perfect (Sic!) continuum, and are empowered by the Unmoved Mover\(^{21}\) — the Final Cause (5.2.1). Which of the two ‘maps’ matches Nature? The answer is very simple: without the vertical dark strips in Fig. 5, there will be only one single ‘snapshot’ of Nature. As John A. Wheeler put it, Time is Nature’s way of keeping everything from happening at once. Ergo, Fig. 8 is false. Forget GR\(^5\) (p. 4).

In general, the notion of spacetime (the left-hand side in Fig. 3) should be treated as an adjective. If we say ‘this is blue’, we have to explain what is ‘blue’ (say, blue Cheshire cat at the right-hand side in Fig. 3). But the spacetime itself (the left-hand side in Fig. 3) does not have its own energy to ‘act back’ on its source: “there is no mutual action of
gravitational fields on matter” (H. Ohanian). The only possible solution is to empower the Cheshire cat (the right-hand side in Fig. 3) with the self-action of gravity: read NB at p. 7 and 5.2.1. With GR, physicists cannot explain even the Earth tides\textsuperscript{9}. Forget GR (p. 4).

5.3. Influence from the future (Fig. 4) can change the past: the grandfather paradox.

5.3.1. Nothing can change the irreversible past in Heraclitean Time: you cannot step twice into the same stream\textsuperscript{11}. With light, we observe the past only post factum, only after the cat Macavity\textsuperscript{19} has already finished its job. The Platonic state of the world “outside the train”\textsuperscript{18} corresponds to the atemporal “gaps” of ‘change of space’ (Ch. 3) viz. the “gaps” between the two consecutive states of the rocket in Fig. 7.

Let’s move to the upper (horizontal) section of Fig. 2 and the doctrine of trialism (p. 3 in The Physics of Life\textsuperscript{1}). I will critically examine the self-action of the human brain — only matter can interact with matter — exhibited in the binding phenomenon, which is acts as “mediator” of the human mind and volition (Res cogitans) via the common source of matter & psyche\textsuperscript{2}, dubbed Res potentia (Fig. 2). The latter lives only in the potential future of the arrow of Time (Fig. 4). Thus, the matter & psyche\textsuperscript{2} are not directly linked — the psyche (Res cogitans) does not have energy to interact with its physical correlate (Res extensa) above your neck, just as there is no generic “gravitational energy” (Zhao-Yan Wu). To explain this counter-intuitive puzzle, I suggested in January 1990 the idea of fundamental dualism\textsuperscript{20}, which was later (April 2000) upgraded to the doctrine of trialism (Slide 14). The idea is as follows.
Suppose you are an Eskimo, who has never seen and will never see an elephant in his life. Yet you can make observations on elephant’s trunk with two complementary devices, measuring either properties of your arm, or properties of your nose. You can never imagine the common source of your arm (Res cogitans) and of your nose (Res extensa), which you blindly called trunk (Res potentia), because the latter does not have any arm-like windows nor nose-like windows: it (not “He”) is ‘the true monad without windows’. You may only suggest that what you see as an arm (Res cogitans) is pre-correlated with what you see as a nose (Res extensa) by pre-established harmony\(^2\). But again, you’re an Eskimo and cannot even imagine the ‘trunk’ (Res potentia).

For example, recall the experiment with your brain in Ch. 4: your brain (nose) interacted with your mind (arm) via their “hub” called trunk or Res potentia in Fig. 2. There is no direct “arm-nose” connection.

Thus, the spacetime engineering (Fig. 1) is based on three matrixes: read closely pp. 9-10 and the explanation of Fig. 4. However, there are many objections to the doctrine of trialism.

5.4. The so-called trunk is utterly controversial, like apples&oranges.

5.4.1. Agree. But the alternative that the psyche emerged from psyche, and matter emerged from matter, leads to infinite regress: ‘turtles all the way down’. There should be a cutoff in Nature, which, for example, prompted Aristotle to suggest the Unmoved Mover\(^21\).
5.5. The so-called trunk (p. 14) is inherently incomprehensible.

5.5.1. True. Our cognition works with a set of objects, call it A, which can be defined only relationally, with respect to another set non-A. The ‘set of all sets’, pertaining to ‘the entire Universe as ONE’, is not a ‘set’. It is inherently incomprehensible to us. But Nature is smarter. The latter may be an undecidable proposition. Ultimately, the trunk is ONE incomprehensible entity, resembling the Noumenon. Nur die Fülle führt zur Klarheit, und im Abgrund wohnt die Wahrheit (Fr. Schiller).

6. References and Notes


Everything changes and nothing remains still — you cannot step twice into the same stream.

12. D. Chakalov (2022), *Spacetime Engineering* 201. Video lecture, app. 20 min; see ref. [53] on p. 24 in *The Physics of Life*.¹

p. 4: “The lesson of these experiments would appear to be that gravity alters the way clocks run. Such a dependence of time on gravity would have been strange enough for the Newtonian view, but General Relativity is actually much more radical than that. A more accurate way of summarizing the lessons of General Relativity is that gravity does not cause time to run differently in different places (e.g., faster far from the earth than near it).

“Gravity is the unequable flow of time from place to place. It is not that there are two separate phenomena, namely gravity and time and that the one, gravity, affects the other. Rather the theory states that the phenomena we usually ascribe to gravity are actually caused by time’s flowing unequally from place to place.”

14. Time along the axis W in Fig. 7 is imaginary: Arthur S. Eddington, *Space, Time and Gravitation*, 1920, pp. 48-51; see also Ethan Siegel.


p. 3: “The essence of the problem lies in the fact that the Einstein equations of general relativity are local equations, relating some aspects of the spacetime curvature at a point to the presence of stress-energy at that point. (...) What general relativity does not do is to provide any natural way of imposing global constraints on the spacetime – certainly the Einstein equations provide no such nonlocal constraint. In cosmology this leads to the observation that the global topology of space is not constrained by the Einstein equations; spatial topology is an independent discrete variable that has to be decided by observation.”
Note: The Einstein equations\textsuperscript{23} (Fig. 3) should be \textit{quasi-local} equations, relating the \textit{local} properties of matter and fields to the nonlocal \textit{global} properties of the entire spacetime \textit{en bloc}. Which is why I suggested the so-called \textit{global mode} of spacetime (Ch. 3). The latter inserts \textit{nonlocal} constraints into every 4D point/event, \textit{perfectly} embedded: think globally (Fig. E), act locally. The end results produce \textit{inertia} and \textit{Killing field}, and \textit{causality} and \textit{time-orientability} in general. \textit{Forget GR.}

http://www.god-does-not-play-dice.net/p_31.jpg


p. 1: “T. S. Eliot described a ‘mystery cat,’ \textit{Macavity}, responsible for all sorts of mischief. But when the crime’s discovered, Macavity’s not there!”

20. D. Chakalov (15 January 1990), \textit{How to Bind Mind to Matter?}


“Finally, I wish to explain why I wrote this paper. Back in November 1989, I completed my first manuscript on the physics of life, entitled: ‘How to Bind Mind to Matter?’ It was dated 15 January 1990, to mark eighteen years of study and research, which I started in January 1972, at age 19. I am old and probably won’t be around to witness the devastating climate catastrophe, but many younger people, including my loved ones, will. I feel like being brutally forced, along with my children and grandchildren, to take a seat in a rubber boat, surrounded by a bunch of crazy idiots, who enjoy rafting on a mountain river toward a gigantic waterfall a few kilometers ahead (p. 38). I can only shout at these morons to stop immediately our boat, before it is too late. For if we pass the \textit{tipping point}, we will be dead close to \textit{Climageddon} and \textit{WWIII}. Don’t even think that \textit{WWIII} cannot happen because governments were “smart”. They are \textit{not}.”
p. 75: “The right side is a formal condensation of all things whose comprehension in the sense of a field-theory is still problematic. Not for a moment, of course, did I doubt that this formulation was merely a makeshift in order to give the general principle of relativity a preliminary closed expression. For it was essentially not anything more than a theory of the gravitational field, which was somewhat artificially isolated from a total field of as yet unknown structure.”

7. Questions & Answers

Q1. You said that you have an equation. What do you mean?

A1. Equations show particular patterns (*Gesetzmäßigkeiten*) in Nature. Please see the so-called *evolution equation* at p. 28 in *The Physics of Life*¹ and read Sec. 8 at pp. 18-19 therein. However, my equation is still in symbolic form, firstly because we need new Mathematics (the so-called *hyperimaginary numbers*) to develop quantum gravity based on the *three types of mass* (positive, negative¹⁵, and imaginary). Thus, my equation is rather an invitation (Q2) for comprehensive research by mathematicians and theoretical physicists with professional knowledge in topology and differential geometry. In my (probably biased) opinion, we have a chance to develop, with industrial spacetime engineering, a new and perfectly clean energy source, which could solve the climate crisis²². We may also learn how to modify *gravity* to fly like a ‘gimbal’.

The ‘gimbal’ is driven only by gravitational radiation reaction, with no external forces. Pity the theory by *Ezra T. Newman et al.* (*J. Math. Phys.* 13 (1972) 1884-1891) is wrong. Do you know how to take surface integrals at infinity (*Fig. E*)? Do you know the origin of gravitational radiation? The *fifth force*. It is an immensely powerful phenomenon (p. 25).

All this is for you, my dear reader. I personally don’t need industrial spacetime engineering viz. new energy sources or new flying machines. I’m fine.
Q2: What numbers are you suggesting?

A2. I called them hyperimaginary numbers, denoted \( w \). If squared, these numbers are exactly nullified: \( w^2 = 0 \). We will use them to present what “happens” within lightlike (null) intervals: “A photon arriving in our eye from a distant star will not have aged, despite having (from our perspective) spent years in its passage” (Wikipedia). Namely, if the squared invariant interval \( \Delta s^2 = 0 \), then \( r^2 = c^2 \Delta t^2 \), which means that the spatial separation is equal to the “distance” light travels — zero\(^{18}\). The normal and tangential “directions” in lightlike intervals are mathematically indistinguishable, but I expect that the atemporal\(^{14}\), not-yet-squared \( w \) will offer a different view, which can help us understand the atemporal “gaps” in Fig. 7 viz. the postulated ‘change of space’ (Ch. 3) and the evolution equation. Qui vivra verra.

Q3. When can we watch your video lecture\(^{12}\)?

A3. Please follow the steps (1)-(2)-(3) at p. 5 in explanation.pdf. I will reply within five working days and will send you the link to my video.

Again, the Platonic origin (\( P \)) of both spacetime and matter (\( Q \)) leads to a new non-linear and self-acting 4D ‘glove’ (M. Escher). Forget GR.

Do not use tensors to develop the correct theory of gravity, in neither side of the equation depicted in Fig. 3. To include the negative mass\(^{15}\) in quantum gravity (p. 18), start with the so-called evolution equation explained on p. 28 (last) in The Physics of Life\(^{1} \): \(|m_i|^2 = |m|^2 \) (Eq. 2).
Q4. How can I learn spacetime engineering?

A4. Read Henry Ford above, pp. 15-25 and C2 (p. 13) in *Quantum of Spacetime*\(^1\), and also pp. iii - vi in Sec. Q&A in *The Physics of Life*\(^1\). However, everything you can learn from me is only half of what you need to practice spacetime engineering — I can only help you get on the right track, so that you are not kicking spoons on the floor (p. 8). The rest you can do only by yourself: ask God (Matthew 7:7) for help, in order to help the people around you. Otherwise it won’t work.

Q5. Can you explain your ideas in simple terms?

A5. Let me use Plato’s allegory of the cave (Wikipedia). Unlike the 4D physical world (e.g., the Sun, see p. 4 in *Time.pdf*), the Platonic world cannot be observed with light\(^18\). But it is not a physical stiff, so do not call it “dark” (p. 6). We are mental “shadows” watching physicalized 4D “shadows”, like the Eskimos (p. 14) pictured below. See also Fig. E.

We apply the Heraclitean arrow of Time\(^11\) to introduce dynamics to the “shadows” above, and suggest three Platonic remnants — “just in the middle between possibility and reality”, Werner Heisenberg\(^10\) — called *matrixes* (p. 5 and p. 9). There is no metric in the *matrixes*, just as there is no distance between the concept of a tree and the concept of a mountain in your memory. We interpret the Platonic *matrixes* as an atemporal luxonic memory of the Universe: “A photon arriving in our eye from a distant star will not have aged” (Q2). Once created, it does not decay (p. 5), and cannot be eaten by worms. Once we drop our old deteriorating “jackets”, we simply go back home\(^18\), *ad infinitum*. Only the math (Q2) is still unknown. Help is needed, time is running out!\(^22\)
Addendum 1

What is spacetime? Why is the Heraclitean Time\textsuperscript{11} imaginary\textsuperscript{14}? Good questions. I can only try to offer my (probably biased) opinion. At the end of the day, I hope you will grasp the doctrine of trialism (p. 13), the “carrot” in Fig. 1, and the issues in Fig. E. But first, what is light?

Rest assured that light itself does not travel anywhere, because it is everywhere (Fig. E). Only the photon travels with the invariant speed denoted $c$. If we try to “look” at 4D spacetime with the physical time read with a clock, we may picture the nodes in Fig. A like “sandbags” (photons) being passed from one node to the neighboring one, thereby creating EM waves. These sandbags (photons) oscillate back and forth to the neighboring nodes, but one cannot time the elementary shift of sandbags/photons between the different nodes in Fig. A. Why? Because the elementary shift of Time (Fig. 7) is atemporal\textsuperscript{14}. With light, we see only the irreversible past (Fig. 4), and with squared physical time (Q2).

Let me try to explain the omnipresent atemporal Ether, depicted with black background in Fig. A and Fig. B. It (not “He”) is the atemporal Platonic world as well (Q5), shown in Fig. E below.

Fig. A. Watch it at YouTube. Fig. B. Watch it at YouTube.

As I mentioned previously, the notion of spacetime (the left-hand side in Fig. 3) should be treated as an adjective (p. 12): spacetime of what? The current theory of relativity, however, cannot include the intact quantum world — read Erwin Schrödinger from 1935 at p. 4, p. 9, and p. 26, and also NB at p. 17 in *The Physics of Life*. The intact quantum world exists as Platonic reality “just in the middle between possibility and reality” (Werner Heisenberg\textsuperscript{10}). Question is, can we talk about an intact quantum-gravitational Platonic world? Yes we can and we must,
because there is no other choice — the current theory of spacetime\textsuperscript{4,5} desperately needs the intact quantum-gravitational Platonic world.

When we talk about ‘space’, we usually imagine something like a vast warehouse that keeps all kinds of objects in it, like planets, stars, etc. We may see the roof of the warehouse with telescopes, but it is like a horizon at sea. Every point in the warehouse is also its legitimate “center”, meaning that even if you travel arbitrarily far away in any direction, you will never get “closer” to the “edge” of the warehouse.

Is the space unlimited? Physicists do not know, because there is too much “mystery matter” to speculate about the shape of the universe.

Let’s start with something we can clearly define locally, such as the dimensions of 3D space (Fig. C), and then will try to increase its size by shooting light beams from the center toward the “edge” of 3D space.

Can light reach the endpoints/edges (if any) of space and stop there? Or perhaps light will bounce back and hit the center of Fig. C below, much like Chuck Norris counted to null infinity and back? No way José.

But is there anything that can wrap the 3D space en bloc? As Stephen Leacock explained: “We cannot imagine that the stars go on forever. It’s unthinkable. But we equally cannot imagine that they come to a stop and that beyond them is nothing, and then more nothing. Unending nothing is as incomprehensible as unending something.”

![Fig. C](image1.png) ![Fig. D](image2.png)

Yes, space is indeed bounded, but not by ‘outer space’ (Ned Wright). The pre-geometric Platonic world (Fig. E) is a different type of reality.
The Universe is like an unbroken ring with no circumference, for the circumference \( W \) is nowhere, and the center \( W \) is everywhere.

**Fig. E.** Read closely p. 18. No “spacetime curvature”.

It wraps the spacetime both “beyond” future null infinity and “inside” every 4D instant here-and-now: split the photon to “see” it (Fig. 4).

Let me try to explain how the *pre-geometric* Platonic world (Fig. E) works with the ‘time of light’, by *assembling* the invariant spacetime interval along the perfectly continual physical time, as read with a clock within every finite interval \( t_2 - t_1 > 0 \) shown in Fig. 7.

We will convert ‘distances in space’ to ‘meters of light-travel time’, so that 1m equals app. 3.3 ns of light-travel time. To quote Edwin Taylor and John A. Wheeler (click **Fig. D**): “We assume that every clock in the latticework, whatever its construction, has been calibrated in meters of light-travel time.”

Calibrated? By what? By the *atemporal* Platonic world. It wraps every 4D spacetime point: see **Fig. 4** and recall the invisible — with light — strips separating the instantaneous frames in the movie reel in **Fig. 5**. More on the *calibration* of the invariant spacetime interval at pp. iv - v in *The Physics of Life*. Notice also the ‘gimbal’ at p. 19. Simple, no?

Now you probably say — naah, there’s no such animal! But is there any *metric* in your memory, with which you could separate, for example, the notion of a tree from the notion of a mountain? They are different concepts and, unlike any physical stuff, they do not decay in time. The same tallies to the Platonic *matrix* (p. 5). The latter is like a Platonic *hand* perfectly embedded in its 4D *glove* (p. 7). With light, we see only a *self-acting* 4D glove (p. 7), and the Platonic *hand* enables the glove to “think” globally and act locally — read the note at p. 18. Which is why the spacetime — the bare grin of the cat without the cat, **Fig. 3** — has *global* properties as well, defined by the *global* (Platonic) mode of spacetime (p. 6). Thus, the *local* properties of mater, defined by the local *physical cat*, and the *global* properties of 4D spacetime defined...
by the matrix (p. 5) are inseparable and perfectly embedded into every spacetime point/event (Fig. 4) in the self-acting 4D glove (p. 7).

The self-action is the hallmark of the physics of Life. This is the fifth force empowering gravity, the human brain, and all living organisms and quantum-gravitational systems. Read p. iii in The Physics of Life¹ and recall Albert Einstein²³. The mythical dark energy, dark matter, and black holes are for the birds (p. 6). You will have to start anew.

To wrap up, let me go back to my announcement from January 1990²⁰. The so-called biocausality is the general form of retarded (no faster than light communication, see 5.3) causality: the cause belongs only and exclusively only to the past light cone of its effect. In all three types of matrixes (p. 5 and p. 9), the feedback from the potential future (Fig. 4) is embedded in the infinitesimal (ε) temporal interval (t₂ - t₁ > 0) along the local (physical) time, explained in Fig. 7. Thus, the feedback from the potential future (Fig. 4) is always inserted in the past light cone of its effect, like the cat Macavity¹⁹: read p. 10 in The Physics of Life¹.

This is the atemporal feedback from the entire Platonic world (for example, in the origin of inertia), encoded in the so-called Zenon Connection (Sec. 4 in Quantum of Spacetime¹). This is the fifth force (5.2.1). In the inanimate macroscopic world (say, your laptop), the feedback from the potential future (Fig. 4), carried out by Macavity¹⁹, is effectively zero, which is why every event ‘here and now’ is FAPP determined only by its past. Subsequently, your laptop cannot act on itself. In all living and quantum-gravitational systems, the fifth force, facilitated by the three matrixes (p. 9), makes them self-acting (p. 7). But only the human brain is equipped with biological and cognitive matrixes (p. 9) and can be trained in spacetime engineering (Fig. 1).

Sure enough, the fifth force (5.2.1) in the human brain is many orders of magnitudes weaker than the Earth tides⁹ and “dark energy” (p. 6), perhaps in the range of the Casimir force. What matters here is that the fifth force may spring from the “negative” energy¹⁵ stored in the quantum vacuum, with the ultimate precision of geometric points.

As an example of biocausality above, recall the correlation of two nuclear submarines, leading to their collision in the Atlantic Ocean in February 2009. If any of their captains was trained in spacetime engineering (Fig. 1), the “synchronicity” could have been avoided by
anticipating their dangerous correlation, much like your brain worked with the painted cube (p. 9). Keep in mind, however, that spacetime engineering (Q4) is not parapsychology: read C2 on p. 13 in *Quantum of Spacetime*. God as Love (1 John 4:8) may very well exist. Surely you can ignore it, but then you could only entertain people with your “magic”, say, with “bus levitation”. We have a different agenda.12,22.

On the theoretical side, we want to restore causality in the quantum world. To paraphrase Einstein, God casts the matrix (p. 5), not the dice. This is *quantum causality*, as the shift to the next future state (Slide 1) is performed with the quantum of action viz. the so-called Zenon Connection (Sec. 4 in *Quantum of Spacetime*). There is no fundamental “uncertainty” in the intact quantum world. Dead matter makes quantum jumps; the living and quantum matter is smarter.

Finally, let me again stress that everything at my website is just a map (Ch. 5). I don’t claim any discovery, firstly because my equation (p. 7) is still in symbolic form (Q2). Quote from p. 8 in *Gravitational Energy*:

There is a nice French saying: *une hirondelle ne fait pas le printemps*. (One swallow doesn’t make a spring.) In my case, I can modify it as follows: Une hirondelle ne fait pas le printemps. Deux hirondelles ne fait pas le printemps non plus. Mais cinq hirondelles … well, that’s a whole new ball game!

I have so far developed five cases of spacetime engineering (Fig. 1). That’s a whole new ball game, in my opinion. But not “discovery”.

Should you wish to learn more (Q3), read my note on physical theology and follow the steps (1)-(2)-(3) at p. 5 in *explanation.pdf*. Good luck.

**Addendum 2**

The second demonstration of spacetime engineering, called brain-controlled quantum tunneling, is scheduled for March 2022. It must be recorded under tightly controlled laboratory conditions at some renowned technical institute or university, under the supervision of qualified physicists and technicians. If I record it alone at my home, people will ignore it and call it “magic”. But any sufficiently advanced technology is indistinguishable from “magic” (Clarke’s Third Law).
The macroscopic quantum tunneling — the first off mystery in quantum mechanics — is known since 1911, thanks to Charles Wilson; read p. 27 in *The Physics of Life*. The case of brain-controlled quantum tunneling may be even more puzzling, as it involves the new biocausality (p. 25) and quantum causality (p. 26). To get you started, let me illustrate the metaphysical principle of locality (an object is directly influenced only by its infinitesimal surrounding) in the inanimate macroscopic world at the length scale of tables and chairs, e.g., in your laptop (p. 25). I will use four snapshots from the trajectory of the billiard ball in Fig. F.

![Fig. F. Compare it to Fig. 5.](image)

Obviously, the first state of the ball can reach its last state if and only if the ball passed through its intermediate states. But suppose that the same ball in Fig. F is pre-correlated with all billiard balls (not shown) via their common potential states, by their intact, atemporal, and not-yet-physicalized Platonic matrix (p. 5) depicted in Fig. G below.

![Fig. G. Read Werner Heisenberg, p. 43.](image)

Then all billiard balls, including the one in Fig. F above, will be EPR-like pre-correlated and will exhibit holomovement like a school of fish. The billiard balls will always follow the principle of locality, but now they will be “alive” and pre-correlated like the neurons in the human brain, participating in their fleeting neural pathways.

Who is playing the “billiard game” using the fifth force (p. 25)? You. Recall the experiment with your brain at p. 9. But to use spacetime engineering (Q4), you will have to increase the fifth force (p. 25) and gain control over the quantum tunneling. If we use the example with
the single billiard ball in Fig. F, now the ball can literally jump into any of its four physical states, via its potential Platonic states in the global mode of 4+0 D spacetime (p. 5 and Fig. E), depicted in Fig. G.

Again, the translocation of the ball between any of its physical states will always follow the principle of locality, only now the ball will face a continuous spectrum of equally-possible physicalizable states, which can be otherwise separated by large (including space-like) distances. In short, the exercise has two stages: (i) make all billiard balls EPR-like correlated or “alive” (p. 27), and (ii) increase further your fifth force (p. 25) to gain control over their future (Fig. G) energy-momentum and angular momentum, until all balls can be tunneled/teleported at the desired location, perhaps like the ‘gimbal’ shown at p. 19.

Now replace the ball in Fig. F with a grain of rice, and all rice in the left jar in Fig. H can “tunnel” into the empty jar at right, nice’n easy. This is brain-controlled quantum tunneling (p. 26). Not “magic”.

As stated earlier, I have to perform the demonstration under strictly controlled conditions, at some technical institute or university in EU. How do we measure the gravitational energy (MTW p. 467) as “apples”? If you wish to learn more (Q3), follow the steps (1)-(2)-(3) at p. 5 in explanation.pdf. I will reply within five working days and will send you the link to my video presentation. The choice is yours (p. 19).

Addendum 3

Is there anything that can wrap the 3D space en bloc (p. 23)? Physicists like Ezra Newman (p. 19) disagreed with my proposal for the topology of spacetime, shown in Fig. E, as if they have any alternative solution.

Let’s see what they can offer. Where is ‘null infinity’ (Chuck Norris)?
Physicists cannot calculate its numerical value (if any), so they use the notion of ‘*sufficiently faraway*’. As an illustration, suppose you are having a BBQ on your terrace. It is a summer day, with air temperature 25 degrees Celsius. You bring your thermometer close to the BBQ and now it reads 50 degrees Celsius. Then you walk away and measure the temperature, until it reaches 25 degrees Celsius, say, 5m away from the BBQ. Likewise, $10^{90}$ km is *sufficiently faraway* (5m from the BBQ) from the Hulse-Taylor pulsar below, courtesy of Bernard Schutz.

From a physical point of view, null infinity is very far away. A measure of how far one has to get from a source to be “near” infinity is to consider the divergence of the true curved-space light-cones from their flat-space approximations, which wind up at spatial infinity. Martin Walker first pointed out the enormous distance required to separate these cones by just one wavelength or period of the gravitational wave, a reasonable length scale for a radiation problem. The separation is something like $2M \ln(r/M)$. Setting this equal to $\lambda$ for the Hulse-Taylor pulsar, we solve for $r$ and find that it is a bit more than $10^{10^9}$ km! This is unimaginably bigger than the observable Universe, whose radius is a mere $10^{23}$ km.

![Wavelength Diagram](image)

Fig. I. For realistic astrophysical sources, read M. Maggiore.

The experts in gravitational wave (GW) astronomy have not calculated the required separation of GW150914 *sufficiently faraway* from the Earth to apply their linearized approximation, after assuming that the dimensionless amplitude (Fig. I) of their GWs is already vanishing small, e.g., “$10^{-21}$ or less” (Lisa Goggin). If GW150914 was “by far the most powerful explosion humans have ever detected except for the big bang” (Kip Thorne), one can expect that the *sufficiently faraway* distance between GW150914 and Earth will be much greater than $10^{90}$.
km (Fig. I). Otherwise Kip Thorne and his collaborators may not use the linearized gravity and have to start from scratch — read Hans Ohanian at p. 4, and try to construct a “geodesic” under the perpetual energy non-conservation due to gravity. More facts at pp. 1-6 in facts.pdf.

Bottom line here is the tantalizing problem of ‘unending something’: read Stephen Leacock on p. 23. The story with the BBQ on p. 29 cannot solve it. Can you suggest some numerical value of “near” infinity, after Roger Penrose? If you cannot, see the topology of spacetime in Fig. E. The infinity does exist in 4+0 D spacetime, as it provides numerically finite yet physically unattainable “boundaries” of the 4D partition of the Universe. Take for example the Beginning at Time zero, denoted A in the continuum of geometric points below (Fig. J).

![Fig. J. See Fig. E.](image)

The closed interval [BC] has a numerically finite value matching the increasing cosmological age viz. the increasing radius of the inflating “balloon” (Slide 2). But to we define [BC], the Beginning at Time zero (A) must disappear: BC = AC - AB. If (AB] is an infinitesimally “running” half-closed interval, B can never reach A and stop there. Hence the Beginning at Time zero and the End at Time infinity are always present in the Platonic world, which leads to physical theology.

If you wish to learn more about Time (Fig. 7), follow steps (1)-(2)-(3) at p. 5 in explanation.pdf. I will reply by suggesting new physics and new Mathematics (Q2). In one sentence, Nature is smarter (5.5.1).

Alternatively, you may wish to explore the current hypotheses of GWs, according to which the GW in Fig. I is made of hypothetical gravitons, as explained by Kip Thorne in his Slides 3 and 4. Nobody has detected them, nor has suggest some perturbative quantum gravity based on gravitons as ‘messenger particles’. Moreover, GW150914 — “the most powerful explosion humans have ever detected except for the big bang” (Kip Thorne) — was totally silent, because “a vacuum BBH merger does not produce any EM or particle emission whatsoever” (LIGO, p. 9 in arXiv:1602.08492v4). It just can’t. It’s a vacuum ghost.
We know nothing about the wave pattern of very strong GWs in the immediate vicinity (M. Maggiore) of GW150914, but the GW experts believe that the same totally unknown (Sic!) pattern was absolutely not (Sic!) altered due to non-linear interactions (MTW p. 968) for one billion years, before being detected on 14 September 2015. Otherwise LIGO will be totally useless, as it cannot detect any non-linear GW.

The only thing GW experts know for sure is that GW gravitons are very easy to produce, as explained eloquently by the Nobel Laureate Kip Thorne and father of GW astronomy in his ‘Gravitational Waves and Experimental Tests of General Relativity’ from 7.09.2012, pp. 31-32:

Exercise 27.8 Problem: Gravitational waves from arm waving

Wave your arms rapidly and thereby try to generate gravitational waves.

(a) Compute in order of magnitude, using classical general relativity, the wavelength of the waves you generate and their dimensionless amplitude at a distance of one wavelength away from you.

(b) How many gravitons do you produce per second?

Fascinating experiment, straight from the horse’s mouth. I strongly recommended it to all GW experts in arXiv:2103.08520 [gr-qc]. If they are too lazy to wave their arms “rapidly” and “generate gravitational waves”, surely they can compute, using “classical general relativity”, how many “gravitons” are produced by an average Hummingbird.

Anyway. The only merit of GW parapsychology is to show how careless are today’s theoretical physicists about the self-acting origin of gravity (Fig. 3). Will leave them and Kip Thorne to simmer in their own sauce.

Acknowledgements

I am grateful to many theoretical physicists for their invaluable (albeit unintended) support, most notably to Ezra Newman and his colleagues for showing in June 1972 the wrong theory of gravitational radiation.

24 September 2021, 15:25 GMT
How many gravitons are produced by an average Hummingbird?

Read the experiment by Kip Thorne at p. 31 (last) in
http://www.god-does-not-play-dice.net/SE.pdf

D. Chakalov
chakalov.net