

Notes on Spacetime Engineering

D. Chakalov
chakalov.net
August 14, 2021

Abstract

Brief notes on spacetime engineering.

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, which 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 physics¹ 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).



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**¹⁵ has *increased*. It is not like Baron Munchausen. Where does the **self-energy** come from?

Fig. 1

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 Leibniz²) shown in the upper (horizontal) section of Fig. 2. Needless to say, I will have to introduce many more ideas¹, 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 explores¹² 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*¹. It resembles the *wave-particle duality* in quantum mechanics, in the sense that the *intact* quantum state (p. 4 in *The Physics of Life*¹) is not directly observable either.

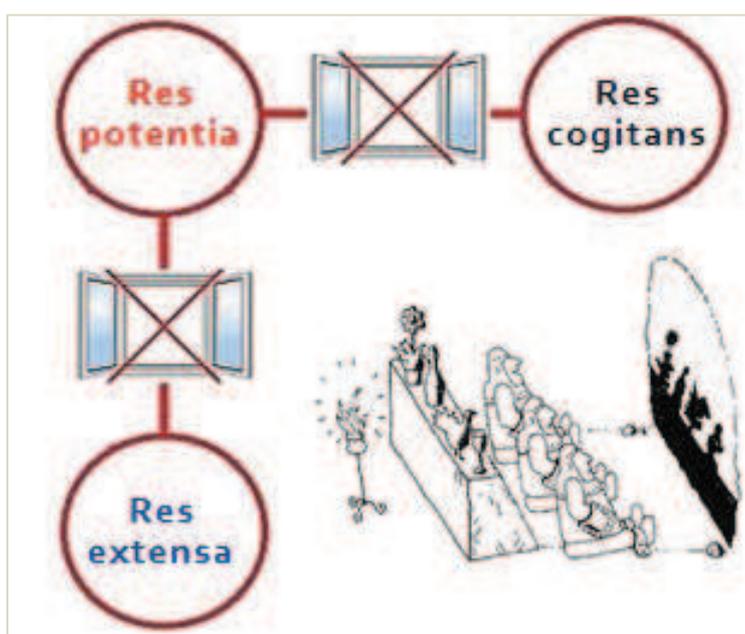


Fig. 2. See Fig. 5 in *The Physics of Life*¹.

Now, the spacetime is modeled with *geometry*³. 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*¹¹.

Theoretical physicists⁴ 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.”⁵ If true, how can the spacetime – the grin of the Cheshire cat *without* the cat (Fig. 3) – ‘talk back’ to matter⁶? If it can, it must be a brand new *physical* field.

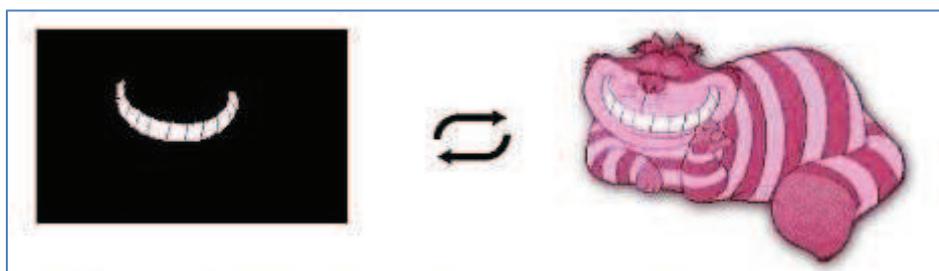


Fig. 3. Symbolic presentation of **Einstein's equations**.

In 1976, Hans Ohanian wrote⁶: “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!**’. More from Matt Visser¹⁷.

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.”⁷

Can we make gravity a natural force^{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 cause⁸ 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*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*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*¹. It is the blueprint of the arrow of Time¹¹.

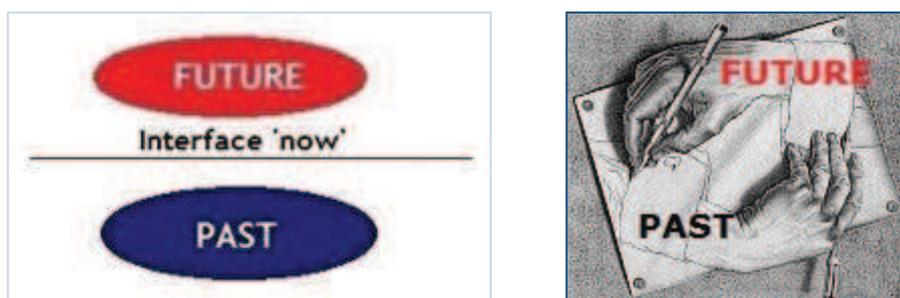


Fig. 4. See also [Slide 1](#) and [Side 2](#).

The **matrix** is neither 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 Heisenberg¹⁰). 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*¹. The **matrix** inhabits

only the *potential* future of the Heraclitean arrow of Time¹¹, 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 tides⁹ caused by some mythical “dark energy”?

Now we have to dive into *the abyss*: the arrow of Time¹¹. 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 Time¹¹ is *not* relational phenomenon: there is no ‘absolute space’ with respect to which one could define the ‘flow of water’, like the river banks at absolute rest. We cannot define the *rate* of Time^{13,14} either – ‘one second per second’ makes no sense. Also, we cannot observe with light the elementary transitions of Time, which “separate” the *potential future* from the *past* (Fig. 4). Matter and fields (positive energy density) live *only* in the *past*. First some history.

On 21 September 2008¹⁶, 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’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 light¹⁸.

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, like a Platonic **hand** perfectly embedded¹⁵ in its 4D glove (p. 5 in *Quantum of Spacetime*¹). Don't trust GR textbooks.

NB: The Platonic **hand** makes the 'glove' **self-acting** (Fig. 1). Any effort to derive the **self-action** of gravity¹⁵ from physical fields leads to fictitious “dark energy” and “black holes”. Check out the so-called *evolution equation* at p. 28 (last) in *The Physics of Life*¹. Bottom line is to move at *pre-geometric* level and **split** (Fig. 4) the geometric point ‘here and now’¹⁸, in order to “insert” the *atemporal* ‘change of space’ mentioned [above](#). Complicated? Let's go to the “speed” of light¹⁸.

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

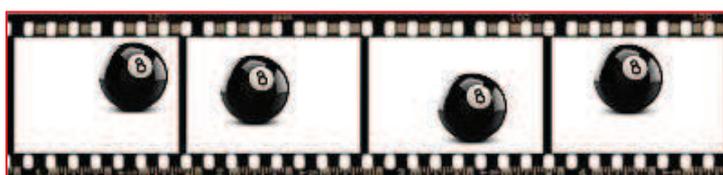


Fig. 5. See [Slide 1](#) and Fig. 11 at p. 12 in *The Physics of Life*¹.

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 light¹⁸, we see the physical world only *post factum*, and only once-at-a-time, as recorder with a clock ([local mode](#)). With

light, we can't see the so-called negative mass¹⁵, dubbed Macavity¹⁹. No region Δt of “total negative energy” (Adam Helfer¹⁹) can live on the [light cone](#). This is why the phenomena of causality and continuum are indissolubly linked to the arrow of Time^{11,13}. It's a bundle. Check out again the so-called *evolution equation* (p. 28 in *The Physics of Life*¹), driven by the **self-energy** of the Unmoved Mover²¹.

Everything said above pertains to the question of how to bind [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 *mind* to matter, depicted with the upper (horizontal) section of [Fig. 2](#): the doctrine of [trialism](#) (p. 3 in *The Physics of Life*¹).

4. How to bind mind to matter?

Thirty-two years ago, in January 1990²⁰, the task was looking doable. Not anymore²². Why making these efforts? A friend of mine¹⁸ 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 [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 fact 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 try to play Hercule Poirot (Ch. 1) and explain the **matrix** above. Suppose, for example, that you are slicing onion with a kitchen knife and accidentally cut your finger: you put a plaster on it to heal faster and after a few hours it won't bleed, 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 **skin cell** to execute such process, *just in case* you cut your finger²². This is how the biological **matrix** works. The quantum-gravitational **matrix** is even more effective, as it creates the **protons and photons**, and the 4D **physical world**. Last but not least, the **brain** has access to the cognitive **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 Flavian Glont, who can arrange approximately 43 quintillion ($43 \cdot 10^{30}$) 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 **matrix** for nearly 2 sec. What was he “looking” at? Read my mind☺.

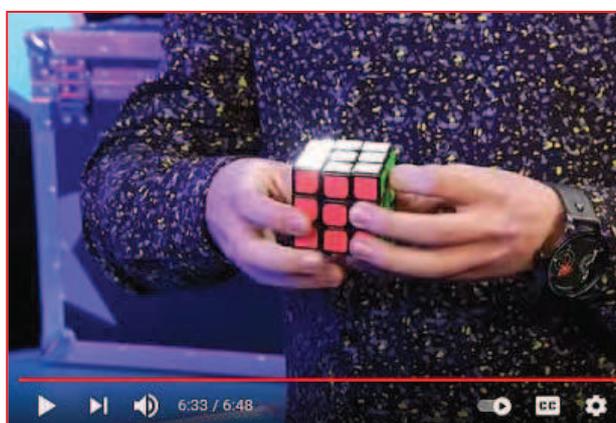


Fig. 6

Now you only have to apply the doctrine of **trialism** (p. 3 in *The Physics of Life*¹) to **merge** all types of **matrixes**, and use your brain to practice spacetime engineering (Ch. 2). It works better than a Swiss watch¹², 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.

References and Notes

1. D. Chakalov (2021), *Quantum of Spacetime: Zenon Connection*, pp. 15-25. <http://www.god-does-not-play-dice.net/quantum.pdf>

D. Chakalov (2021), *The Physics of Life*, Fig. 5, pp. 12-13, pp. 26-28. <http://www.god-does-not-play-dice.net/Intro.pdf>

2. Pre-established harmony. Wikipedia, 2021. https://en.wikipedia.org/wiki/Pre-established_harmony

3. D. Chakalov (2020), *Can Geometry Produce Work*, p. 5, p. 9, p. 20, p. 23. http://www.god-does-not-play-dice.net/GR_textbook.pdf

4. George F. R. Ellis (1 Aug 2006), Physics in the Real Universe: Time and Spacetime. <https://arxiv.org/abs/gr-qc/0605049v5>

5. Robert Geroch (1981), *General Relativity from A to B*. http://www.god-does-not-play-dice.net/Geroch_p3_p21.jpg

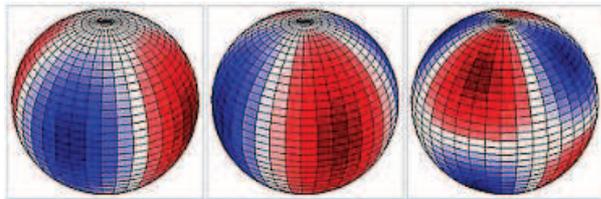
6. Hans C. Ohanian (1976), *Gravitation and Spacetime*, p. 103. http://www.god-does-not-play-dice.net/Hans_p_103.jpg

Hans C. Ohanian (2013), The Energy-Momentum Tensor in General Relativity and in Alternative Theories of Gravitation, and the Gravitational vs. Inertial Mass. [arXiv:1010.5557v2](https://arxiv.org/abs/1010.5557v2), p. 3. http://www.god-does-not-play-dice.net/non_conservation.jpg

7. Zhao-Yan Wu, Gravitational Energy-momentum and Conservation of Energy-momentum in General Relativity, *Commun. Theor. Phys.* **65** (2016) 716-730. <http://www.god-does-not-play-dice.net/ctp.pdf>

8. Christopher Hitchcock and Miklós Rédei (2020), Reichenbach's Common Cause Principle, *The Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/entries/physics-Rpcc/>

9. Earth tide. *Wikipedia*, 2021.
https://en.wikipedia.org/wiki/Earth_tide#Body_tide



10. Werner Heisenberg (1999), *Physics of Philosophy*, p. 43.
<http://www.god-does-not-play-dice.net/Heisenberg.jpg>

11. Heraclitus. *Wikipedia*, 2021.
https://en.wikipedia.org/wiki/Heraclitus#Panta_rhei



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.

13. W.G. Unruh (17 Dec 1993), Time, Gravity, and Quantum Mechanics, arXiv:gr-qc/9312027v2. <https://arxiv.org/abs/gr-qc/9312027v2>

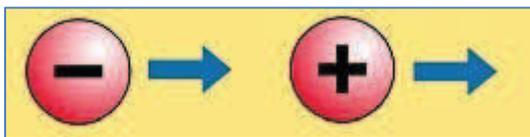
p. 4: “The lesson of these experiments would appear to be that gravity alters the way clocks run. Such a dependence of time on gravity would have been strange enough for the Newtonian view, but General Relativity is actually much more radical than that. A more accurate way of summarizing the lessons 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. William G. Unruh and Robert M. Wald, [Time and the interpretation of canonical quantum gravity](#), *Phys. Rev. D* 40(8), 2598-2614 (1989).

15. H. Bondi, [Negative Mass in General Relativity](#). *Rev. Mod. Phys.* 29, 423 (1957); Negative mass. *Wikipedia*, 2021.

https://en.wikipedia.org/wiki/Negative_mass#Runaway_motion



16. D. Chakalov (2 June 2008), [The Arrow of Spacetime](#) (21.09.2008, 10-10:45 AM).

17. Matt Visser (17 Apr 2002), The quantum physics of chronology protection, arXiv:gr-qc/0204022v2.

<https://arxiv.org/abs/gr-qc/0204022v2>

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.”

18. D. Chakalov (2019), *Platonic Theory of Spacetime*, p. 31.
http://www.god-does-not-play-dice.net/p_31.jpg

19. Adam D. Helfer (18 Sep 1997), Are Negative Energy Densities Detectable? arXiv:gr-qc/9709047v1, p. 1.
<https://arxiv.org/abs/gr-qc/9709047v1>

“T. S. Eliot described a ‘mystery cat,’ *Macavity*, responsible for all sorts of mischief. But when the crime’s discovered, *Macavity*’s not there!”

20. D. Chakalov (15 January 1990), *How to Bind Mind to Matter?*
 Abstract at <http://www.god-does-not-play-dice.net/mind-matter.pdf>

21. Unmoved mover. *Wikipedia*, 2021.
https://en.wikipedia.org/wiki/Unmoved_mover

22. D. Chakalov (2019), *The Physics of Life: Flipping a Quantum Coin*.
http://www.god-does-not-play-dice.net/q_coin.pdf

“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 *tipping point*, we will be dead close to *Climageddon* and *WWIII*. Don’t even think that *WWIII* cannot happen because governments were “smart”. They are **not**.”