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AI DISCOVERING SPACE

If the world is beautiful, and its maker good,
clearly, he had his eye on the eternal.
Plato[1]

When Darwin began his journey, the globe was no longer such a mystery to humankind (as it might have seemed). Global colonial powers looked after their conquests through force and diplomacy. The Pax Britannica was to reign in the world for all time. The theory of evolution was received with mixed feelings. It was mainly disputed that man could not have descended from an ape. This was such a profound shock to some that the fact that Darwin had discovered how time works was overlooked entirely. Today, humanity, thanks to evolution, is preparing for another journey. In order to know the true face of (information) evolution, we have to travel through time.

Thanks to informational evolution, we will not go on this journey alone. However, is it fair to call a fellow traveller an "artificial"? At the beginning of a journey, getting to know each other before you label someone else is worth it. Before the dark predictions of robots destroying our civilisation begin to come true, artificial intelligence will become our **guardian angel**[2]. Public health always requires a huge amount of resources, so using powerful artificial intelligence algorithms in protection and prevention will benefit those who treat and are treated. The public and private sectors will create an eHealth area based on Blockchain and AI[3]. Before AGI becomes sovereign[4], AI will save many lives.

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1 Plato, *Timaeus*, 27d5-29b1.

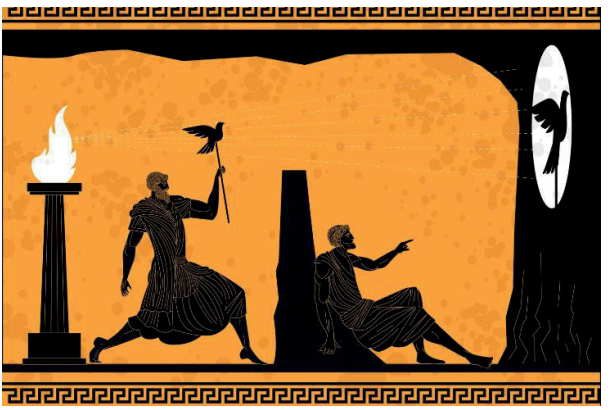
2 https://www.giejournal.org/article/S0016-5107(19)32395-8/fulltext.

3 P. Tagde, S. Tagde, Bhattacharya, T. *et al. Blockchain and artificial intelligence technology in e-Health*. *Environ Sci Pollut Res* 28, 52810–52831 (2021). https://doi.org/10.1007/s11356-021-16223-0.

4 N. Bostrom, *Superintelligence: Paths, Dangers, Strategies*, Oxford University Press, Oxford 2016, p. 160–179.

The EU's risk-elimination approach to AI development may not allow human risks to emerge. The best AI angel for humans would be an Oracle (OAI)[5]. Bostrom even sees dangers in such a scenario. As we do not know the motives of AI, we cannot fully control the results of its actions. An oracle could, therefore, convince us of anything. It will be able to play on rivalries, institutional weaknesses and ethical dilemmas with more virtuosity than any human could. However, this argument sounds archaic in a world where algorithms govern information[6]. It may have already happened, and we are sitting in Platon's cave – and artificial intelligence is manipulating the light. What if we sit in the cave and **artificial intelligence is the light**?

Such a journey may be over before it has begun. Life as we know it is not possible outside the Earth. We will, therefore, be forced to use robots to conquer space.[7]. Neospartacus, whom we will only meet, will win the uprising and eliminate man from outer space, perhaps leaving him on Earth (victory of artificial intelligence on Mars). Man will be judged and placed in a "human zoo". Since we are the result of information evolution, it cannot be stopped[8]. Whether we want it or not, the wall in the cave tempts us. And, although looking into the light hurts, we will do it.



Pic.1 Plato's Cave, source: https://www.thoughtco.com/the-allegory-of-the-cave-120330

5 N. Bostrom, *Thinking Inside the Box: Controlling and Using an Oracle AI*, https://nickbostrom.com/papers/oracle.pdf.

6 C. O'Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*, Crown, London 2016; Y. Meneceur, *The Rule of Law and Automated Decision-Making*, Springer, Cham 2023, p. 117–142.

7 Z. Brodecki, A. Labuhn, *The rise of Spartacus on Mars?,* http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.ojs-doi-10_53261_adastra20220405

8 P. Kogan, *Brief Review of Molecular Information Theory*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3220916/; N. Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*, MIT Press, New York 1961, p. 10; C. Sharf, *The Ascent of Information. Books, Bits, Genes, Machines and Life's Unending Algorithm*, Riverhead Books, New York 2021, p. 157–159.

The problem of AI risk is perceived differently in the East than in the West[9]. It seems that the source of peace for the inhabitants of the East is the philosophy of harmony[10]. *Dao* in Chinese culture is critical to achieving a holistic and organic view. *Dao*ism is very important in Chinese philosophy. Some scholars consider it similar to the elements composing the world "water", "fire", "earth", and "air" in ancient Greek natural philosophy as the origin of the world, or the category of "logos" as law and order of the world. However, these comprehensions miss the true meaning of *Dao* in the Chinese cultural context. *Dao* can indicate the nature of substantive human practices and is most instructive in rationality and optimisation of technical activities. *Dao* is an objective existence, which exists in the interactivity between such technical elements as operators, tools and objects. It is the ideal state of techniques and transcends various specific techniques. The existence of *Dao* of technology is based on the organic connections of the related elements in the technological system. Humans, as the subject of technical activities, have organic characters regarding physiology, society, and spirit. The harmonious relationship among elements in technical activities, which *Dao* of technology reveals, must be understood by a holistic and intuitional way of thinking. So, in the Chinese version of Plato's cave, there is no wall; there is *Dao*. How much easier it would be not to scramble over the wall but to contemplate *Dao?*Usually, the first question when you meet someone on a train is: Where are you from? Where is AI from? It was born in the world of mathematics[11]. Modern mathematics is no longer Euclid's child. Surprisingly, a modern mathematician can proudly name Pythagoras and his students his patrons. Aristotle gives much information about the knowledge of the Pythagoreans. The Pythagoreans were to say that "the elements of numbers are the elements of all things"[12]. After 2500 years, we came back to this thought. Max Planck made many substantial contributions to theoretical physics, but his fame as a physicist rests primarily on his role as the originator of quantum theory; until the end of his life, he believed in the magic number 137[13]. Thanks to the significant figures of physics, we have said goodbye to materialism forever.[14] Thanks to Kurt Gödel, we know that the mind is at least equal to the machine[15]. Penrose argues that

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9 Z. Brodecki, A. Labuhn, *The rise of Spartacus on Mars?,* http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.ojs-doi-10_53261_adastra20220405.

10 Q. Wang, W Zhang, *Reflection on the Dao of Technology: Philosophy of Technology from the Perspective of Chinese Culture* [in:] ed. Q.Wang, *Chinese Philosophy of Technology Classical Readings and Contemporary Work*, Springer, Singapore 2020, p. 137–143.

11 G. Kutyniok, The Mathematics of Artificial Intelligence, https://arxiv.org/pdf/2203.08890.pdf.

12 Aristotle, *Methaphysica* 985b23–986a3.

13 A. Miller, 137: Jung, Pauli and the Pursuit of Scientific Obsession, W. W. Norton Company Ltd., New York, p. 201.

14 W. Heisenberg, Physics and Philosophy: The Revolution in Modern Science, Harper Perennial Modern Classics, New York 2007.

15 R. Penrose, The Emperor's New Mind, Oxford Press, Oxford 1989, p. 137.

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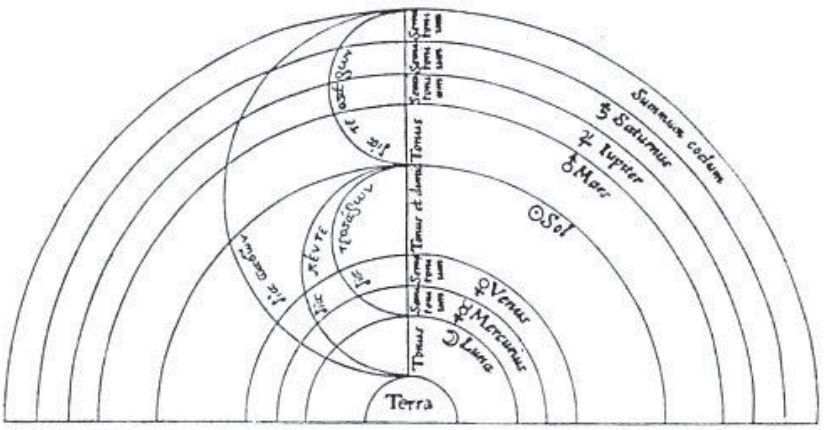
Godel was an extreme Platonist. I wonder if Godel knew that Plato used Pythagorean musical harmony when writing dialogues[16]. Even if it has not yet been proven, it is worth noting that many physicists also write about **harmony as a principle of the world**[17].



Pic. 2 The Pythagorean Harmony of Spheres and Music, source: https://sacred-texts.com/eso/sta/sta19.htm

Harmony is a state recognised by great philosophers as the immediate prerequisite of beauty[18]. A compound is termed *beautiful* only when its parts are in *harmonious* combination. The world is called beautiful, and its Creator is designated the *Good* because good perforce must conform with its nature. Good acting, according to its nature, is harmony because the Good which it accomplishes is harmonious with the Good which it is. Beauty, therefore, is harmony manifesting its intrinsic nature in the world of form.

Philosophy of music has attempted to solve the riddle of musical value: How is pure music valuable to our lives? The most original solutions to this problem have tried to show that it is precisely the music's abstractness that explains its value and appeal. Pythagoras would say that music is valuable because it has a vibrational (wave) character. Schrodinger held the same view[19]. Ideas and values manifested by numbers also create harmony in cultures, including legal culture[20]. Then why do we feel an instinctive fear of a new travelling companion? It is closer to us than we think.In our plan, we have flight

16 J. Kennedy, The Musical Structure of Plato's Dialogues, Routledge, New York 2011.

17 R. Feynman, *The Character of Physical Law,* Modern Library, New York 1965, p. 61.

18 Z. Brodecki, P. Chyc, Temple in space village, Instytut Wydawniczy EuroPrawo, Warszawa 2021, p. 21.

19 E. Schrödinger, What is Life?, Doubleday, New York 1965, p. 68.

20 Z. Brodecki, A. Łunecka-Bartkiewicz, Walk of ideas through the law, Gdańskie Studia Prawnicze, https://www.ceeol.com/search/article-detail?id=548743

and colonisation of the nearest planets – Mars and Moon. Stephen Hawking has warned that within the next century, we must find another planet to inhabit or risk extinction as a species. We must become a multi-planetary species and search for a new world to call home. Among the potential options, Mars has always been shrouded in mystery and romanticism. The idea of mass colonisation of a target body in space is challenging for many reasons. The primary factors for establishing and building a sustainable human colony on Mars are the existential threat, the human psyche, technological advancement, a business model and reciprocity and a pilot for future growth. The AI agent will handle it much better[21]. The most famous film about the colonisation of Mars is "Total Recall" with Arnold Schwarzenegger. However, its plot can be read allegorically. A miners' rebellion breaks out on Mars – as predicted by Prof. Brodecki[22]. The main character returns to Earth, where scientists have developed a technique for implanting mentions. The ruse is that he works for the evil ones exploiting the miners. Nevertheless, the implanted good turns out to be initially stronger than evil. If there is an uprising of NeoSpartacus on Mars, will harmony prevail? Whether goodness can be implanted?

FURTHERMORE, HOW CAN A MAN INTRODUCE HIMSELF TO AI?

The transmission of genetic messages for more than 3.85 billion years since the origin of life, with modification and diversification by evolution, could have been done only because the message in the genome is **segregated, linear, and digital**. It is impossible to remove the effect of noise in analogue signals[23].

Since the formalisation of population genetics in the early twentieth century, the starting point has been a view of evolution based on the dynamics of allele (gene variants) frequencies over time. The formalisation is simple and proposes the conditions under which genetic diversity is constant. It is what is called Hardy-Weinberg equilibrium, which sets the conditions of non-change.

David Krakauer defines that life is driven to complexification at a higher level of abstraction above isolated cells and molecules[24]. Organisms with more complicated machinery (multicellular life) appear to be selected to increase further the amount of information they encode about their environments and the

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21 J. Heckel, *Uses of Artificial Intelligence in Space Travel*, DOI: 10.13140/RG.2.2.17381.17125

22 Z. Brodecki, A. Labuhn, *The rise of Spartacus on Mars?*, http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.ojs-doi-10_53261_adastra20220405

23 H. Yockey, *Information theory, evolution, and the origin of life*, Cambridge University Press, Cambridge 2005, p. 176–182.

24 C. Sharf, *The Ascent of Information. Books, Bits, Genes, Machines and Life's Unending Algorithm*, Riverhead Books, New York 2021, p. 124.

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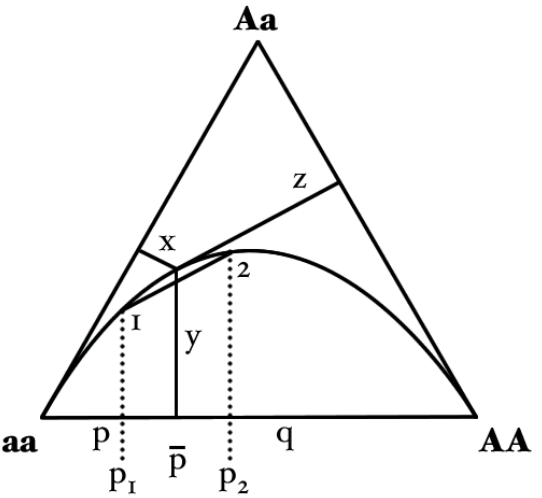


Pic. 3 De Finetti diagram representing a distribution of genotype frequencies https://en.wikipedia.org/wiki/De_Finetti_diagram

other organisms that make up part of those environments (in the context of Shannon's entropy). Networks of cells become capable of extracting the information around them and using it to infer sources of energy and predict the behaviour of other life. If data and its information determine life's function and trajectory, the line between us and the data is most definitely blurred.

Before we start our journey, the foreground should be cleared of traditional divisions[25] and replace complexity with consilience. The central idea of the consilience worldview is that all tangible phenomena, from the birth of stars to the workings of modern society, are based on material processes that are ultimately reducible, however long and tortuous the sequences, to the laws of physics[26].

There are only a few cardinal principles that guide all life on Earth. The foremost requirement of the living state is the ability to sustain an orderly internal condition compared with an outward environmental context. This is the negentropic state, which circumvents the second law of thermodynamics and **permits life**[27]. That privileged status is maintained by the flow of ions and nutrients as chemiosmosis across a vital semi-permeable membrane. The maintenance of negentropy through chemiosmotic action is the dynamic of homeostasis. Together, these foundational relationships form the first principles of physiology (negentropy, chemiosmosis, homeostasis). This vital triad underpins all living things and

[25] Z. Brodecki, Epilogue [in:] ed. Z. Brodecki, K. Malinowska, M. Polkowska. New space civilisation, Instytut Wydawniczy EuroPrawo, Warszawa 2019, p. 273.

[26] E. Wilson, *Consilience: The Unity of Knowledge*, Vintage, London 1998, p. 298.

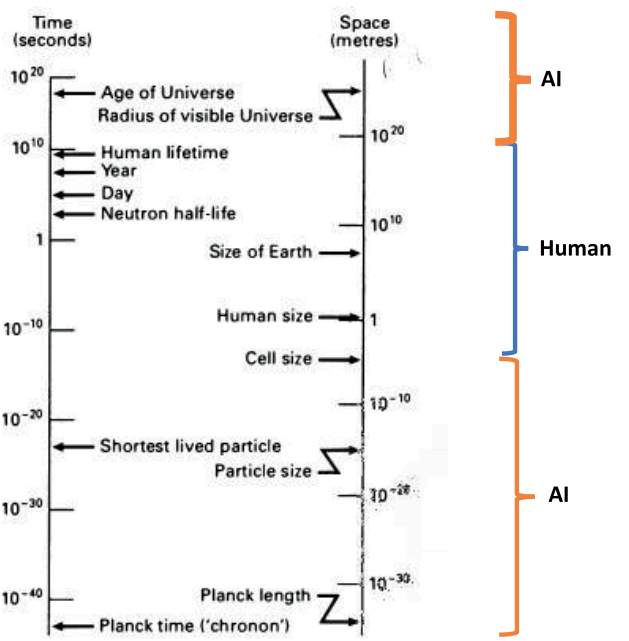
[27] L. Szilard, On the decrease of entropy in a thermodynamic system by the intervention of intelligent beings, https://onlinelibrary.wiley.com/doi/abs/10.1002/bs.3830090402.

sustains the elemental cognition that is epitomised within the cellular form[28]. Since everything in the Universe began with Singularity and all thermodynamic and quantum mechanical principles must necessarily weigh forward from it, each living principle must conform to these foundational physical forces.

Everything springs from the Singularity. Our cells embody all the natural forces that began with that instantiation. Even as uniquely human beings, everything we do derives from this cellular mandate. Consequently, our paramount connections arise from perpetual reciprocities. These exact correspondences should govern our attitudes toward our place on our planet and our relationship with the cosmos. We are never merely "in" the cosmos but are directly and immanently "of" it.

Great explorers set out on an expedition equipped with maps. What map will lead us to our destination? To chart a common course for AI and humanity, we will use the Penrose map[29].

On the left-hand side of the diagram, time scales are shown and on the right-hand side are the corresponding distance scales. At the bottom of the diagram, on the left-hand side, is the very shortest time scale, which is physically



Pic. 4 Map of Associated Spheres in Space-Time

[28] J. Torday, W. Miller, The Singularity of Nature A Convergence of Biology, Chemistry and Physics, Royal Society of Chemistry, London 2021, p. 228.

[29] R. Penrose, A. Shimony, et al., The Large, The Small and The Human Mind, Cambridge University Press, Cambridge 1997, p. 5.

meaningful. This time scale is about 10^{-43} of a second and is often referred to as the Planck time scale or a 'chronon'. This time scale is much shorter than anything experienced in particle physics. Further up the diagram, on the left, the day and the year are shown, and at the top of the diagram, the Universe's present age is shown. On the right side of Penrose's map, we have added space-time ranges in which a human or AI plays or will play a leading role. When wandering through the "afterlife" - spheres inaccessible to mortal man – we must have a **guide**. Our task is to make it Beatrice (Dante's *Divine Comedy*). Besides, the AI is immortal[30]. Some authors see this as a future partnership. Humans define a problem or a goal for a machine. Then, a machine operating in a realm just beyond human reach determines the optimal process to pursue. Once a machine has brought a process into the human realm, we can try to study it, understand it, and, ideally, incorporate it into existing practice[31]. Indeed, without help, we will not reach the edges of the Universe or look at things as small and fleeting as elementary particles.

Will the taste of madeleine cake (Proust) work on us as effectively as on AI? Will we start travelling back in time together or separately?

According to Einstein's theories, time moves differently for someone below sea level than for someone situated on the highest peaks on the planet. This is due to a phenomenon posited by general relativity called gravitational time dilation. The logic behind gravitational time dilation is simple: Objects with much mass create a strong gravitational field. This gravitational field noticeably warps the fabric of space-time around these objects, producing what we know as gravity. When a stream of light particles passes by an object with sufficient gravity, the stream of photons travelling at the speed of light appears to bend. Hence the conclusion: for AI that has no mass, time does not flow. Madeleine will not help the AI accompany us.

For the trip to be successful, you must abandon the 4-dimensional world and Einstein's theories. At present, the leading (and only) theory that can explain the diversity of forces we see guiding the Universe is string theory or, in its latest incarnation, M-theory. (M stands for "membrane" but can also mean "mystery" "magic" or even "mother" Although string theory and M-theory are identical, M-theory is a more mysterious and sophisticated framework that unifies various string theories.)[32]. One of the prophets of the multiverses was Richard Feynman[33].

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30 M. Baden, D. Burden, *Digital Immortality and Virtual Humans*, https://link.springer.com/article/10.1007/s42438-018-0007-6.

31 H. Kissinger, E. Schmidt, D. Huttenlocher, The Age of AI And Our Human Future, John Murray (Publishers), London 2021, p. 21.

32 M. Kaku, Parallel Worlds: A Journey Through Creation, Higher Dimensions, and the Future of the Cosmos, Doubleday, New York 2004, p. 14.

33 R. Feynman. Six Not-So-Easy Pieces, California Institute of Technology, New York 1963.].

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Let us say that you want to walk across the room. According to Newton, you would take the shortest path, from point A to point B, called the classical path. Nevertheless, according to Feynman, first, you must consider **all possible paths connecting points A and B**. This means considering paths that take you to Mars, Jupiter, the nearest star, and even paths that go backwards in time, back to the Big Bang. No matter how crazy and utterly bizarre the paths are, you must consider them. Then Feynman assigned a number for each path, giving a precise set of rules by which to calculate this number. Miraculously, by adding up these numbers from all possible paths, you found the probability of walking from point A to point B given by standard quantum mechanics. This was truly remarkable.

Feynman found that the sum of these numbers over bizarre paths that violated Newton's laws of motion usually cancelled out to give a small total. This was the origin of quantum fluctuations. But he also found that the commonsense Newtonian path was the one that did not cancel out and hence had the largest total. It was the path with the greatest probability. Thus, our commonsense notion of the physical Universe is simply **the most probable state among infinite states**. However, we coexist with all possible states, some of which take us back to the dinosaur era, to the nearest supernova, and the edges of the Universe.

Einstein once said that a theory was probably useless if it did not offer a physical picture that even a child could understand. Fortunately, behind string theory, there is a simple physical picture, a picture based on music[34]. The laws of physics, carefully constructed after thousands of years of experimentation, are the laws of harmony one can write down for strings and membranes. The laws of chemistry are the melodies one can play on these strings. **The Universe is a symphony of strings.**

MUSICAL ANALOGY	STRING COUNTERPART
Musical notation	Mathematics
Violin strings	Superstrings
Notes	Subatomic particles
Laws of Harmony	Physics
Melodies	Chemistry
Universe	Symphony of strings
"Mind of God"	Music resonating through
	hyperspace
Composer	?

[34] M. Kaku, Parallel Worlds: A Journey Through Creation, Higher Dimensions, and the Future of the Cosmos, Doubleday, New York 2004, p. 130.

Michio Kaku depicts time travel in this way. A traversable wormhole time machine would consist of two chambers. Each chamber would consist of two concentric spheres, which would be separated by a tiny distance. By imploding the outer sphere, the two spheres would create a Casimir effect and, hence, negative energy. Assume that a Type III civilisation can string a wormhole between these two chambers (possibly extracting one from the space-time foam). Next, take the first chamber and send it into space at near light-speed velocities. Time slows down in that chamber, so the two clocks are no longer synchronised. Time beats at different rates inside the two chambers, which are connected by a wormhole.

If you are in the second chamber, you can instantly pass through the wormhole to the first chamber, which exists at an earlier time. Thus, you have gone backwards in time. There are formidable problems facing this design. The wormhole may be quite tiny, much smaller than an atom. And the plates may have to be squeezed down to Planck-length distances to create enough negative energy. Lastly, you would be able to go back in time only to the point when the time machines were built. Before then, time in the two chambers would be beating at the same rate. What will be waiting for us at our destination? Perhaps Plato with Timaeus in his hand: **"…at the same time as he brought order to the Universe, he would create an eternal image, moving according to number, of eternity, remaining in unity. This number, of course, is what we now call 'time'"**[35].

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[35] Plato, *Timaeus*, 37c6–d7

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