Musman

FUTURE MIND vs ARTIFICIAL INTELLIGENCE:

MYSTERIOUS MATHEMATICAL COMPUTATIONAL MIND IN HUMAN BRAIN

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It started from our dawn civilization around 6000-50K years ago. We're "switched on" to read/write in mind. We started to paint on stone. We started to count, add, substract in mind. We started to write symbols on stone. We started a civilization. Then we read/write universe space time journey history. Is now human civilization an end-state condition to Big Bang? Let's follow debates and arguments of our cosmology.

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FOREWORD

Mohamad Musman was born 7 March 1961 in Lampung Province, Indonesia. Since chilhood 12 years old, he's interested to read books philosophy and world history. He graduated electrical engineering ITB Bandung, 1986, Indonesia.
He wrote energy research book "**Indonesia Reform, what's the matter?**" Now in he's 60 years old, he is still a field worker as an electrical engineer.

In early 2000, Mohamad studied that birth of civilization 6000-50,000 years ago, began with emergence of human ability to read and to write in his mind with basic mathematical counting, adding, subtracting, symbolizing. Mohamad thinks, this special computational ability is *"timely switched on"* during human brain evolution. Next question, where is the source of *computational mathematical games kingdom,* or we're in same flight cockpit of computational consciousness journey to see 13.8 billion years of universe. It is easy to create micro-processor of counting, adding, for a computer. But it looks impossible to identify this simple processor in our billion neurons of our brain. Because we're in same "cockpit". It is very very near our neck, but it will be forever untouchable dark.

Musman

1000 exp (+1000) Universe Algorithm Was Created Before The Big Bang

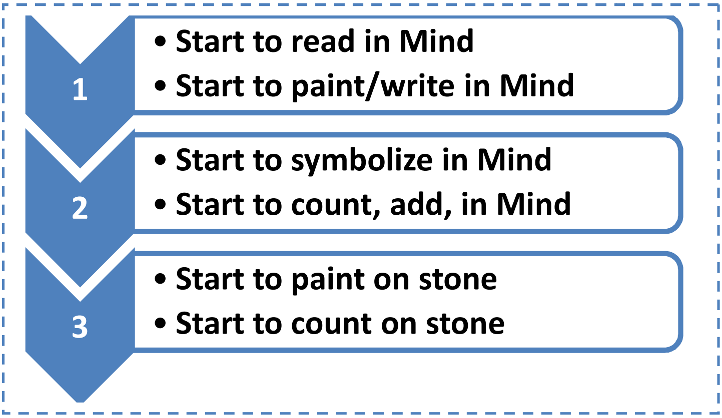
I. What was happened 6000 years ago

1.1. We're *"switched on"* to read/write in mind

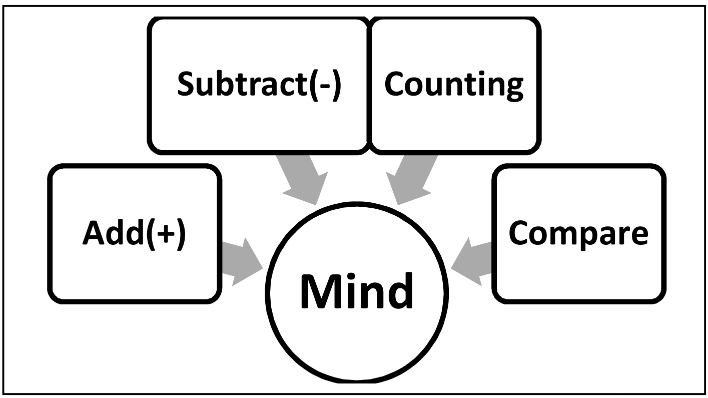
What happened to the early human species Homo sapiens, in China, Africa, Mesopotania, Europe, Russia, and the rest of the world, 6,000 – 50,000 years ago, suddenly began to be able to read and write in his mind.

1. **What's happened 6000-50,000 yrs ago**
2. **Facts of Mysterious Computational Mind**
3. **Facts of Homo Sapiens Species**

This is a miraculous process of evolution, *suddenly starting to be able to read and write in the mind, a connection process of universe computational consciousness.* The process of evolution shows a miracle, such as the process of switching on to be connected.

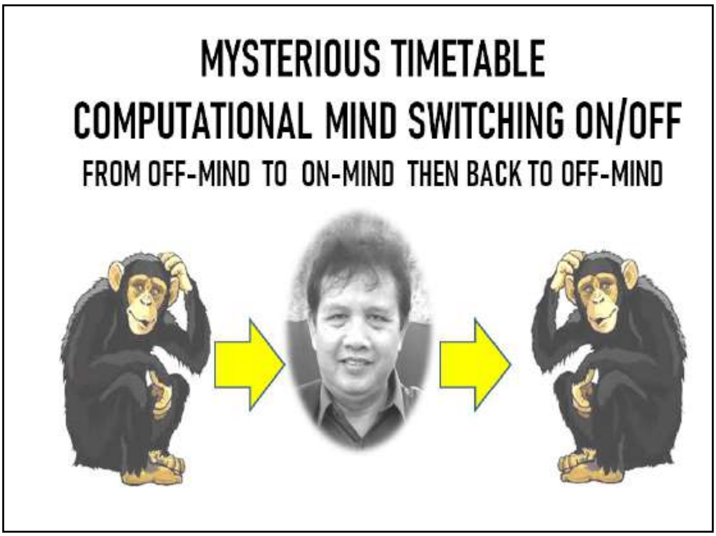


Whatever happened in the billions of nerves in the brain of Homo sapiens, 50,000 years ago, that was a simultaneous process in black skinned humans, white-skinned humans, yellow-skinned, blue-eyed, slanted-eyed humans all over the earth's surface.
The mathematical language of cosmology remains the same, the language of the various species of homo sapiens throughout the world, becomes different, the symbols of the alphabet, the symbols of the written letters of the language can differ greatly between the Chinese, Latin, and Arabic letters.



What a miracle is that the mathematical language of computational algorithms remains the same, adding, counting, subtracting, comparing it remains same in the human mind. This has occurred in the mysterious human mind about 6000-50,000 years ago.

Mysterious timetable of mind switching OFF/ON/OFF can be deciphered as off-mind chimpanzee sees why human has computational mind but chimpanzee's not, next on-mind human would see the past and the future states when human started from off-mind state conditions like chimpanzee and next probably human would be possible to be switched-off mind at mysterious set up time to allow next universe cycle. This is reality what's was happened that human has just presented in 6000 years and ***future time of civilization is a mystery.***



What is simple understanding of a switch in computer network compare to computational mind? A switch is a device in a computer network that connects other devices together. Multiple data cables are plugged into a switch to enable communication between different networked devices. Switches manage the flow of data across a network by transmitting a received network packet only to the one or more devices for which the packet is intended. Each networked device connected to a switch can be identified by its network address, allowing the switch to direct the flow of traffic maximizing the security and efficiency of the network. A switch is more intelligent than an ethernet hub, which simply retransmits packets out of every port of the hub except the port on which the packet was received, unable to distinguish different recipients, and achieving an overall lower network efficiency.

Then we see, humans are currently able to create artificial intelligence of information data switching system of complex and complicated computer network system. These are all imitations of the computational mind system.

At the end, the human mind, which is a mathematical computational mind, will continue to look for its origin, this shows a process of iterating algorithms from a probablistic equation. Currently humans are able to measure the age of the universe as far as 13.8 billion years

Civilization is actually information system flows of read/write/civilization learning with computational mind system since 6,000 years ago (4000 BC). For example civilizations began in the Mesopotamia/Fertile Crescent region (around the location of modern-day Iraq). Earliest supposed dates for the domestication of the horse and for the domestication of the chicken, invention of the potter's wheel. For decades, school children have learned that human civilization emerged about 5000 years ago along the Euphrates River in Mesopotamia, along the Nile, and along the Indus River. But archaeologists working in a broad arc from the Russian steppes through Iran and onto the Arabian Peninsula are finding evidence that a complex network of cities may have thrived across the region in roughly the same era, suggesting a dramatic new view of the emergence of human civilization.

According to Mohamad Musman, to understand theory of consciousness, researchers must focus on events 6000-50,000 years ago, when human civilization was born, which actually phenomena human brain gains mysterious computational ability to count, add, subtract, compare in his mind, and then now comparing with human ability to create artificial intelligence mind, what are next purposes for human civilization future.

A science of consciousness must explain the exact relationship between subjective mental states and brain states, the nature of the relationship between the conscious mind and the electro-chemical interactions in the body (mind–body problem). In this context the neuronal correlates of consciousness may be viewed as its causes, and consciousness may be thought of as a state-dependent property of some undefined complex, adaptive, and highly interconnected biological system. Discovering and characterizing neural correlates does not offer a theory of consciousness that can explain how particular systems experience anything at all, or how and why they are associated with consciousness, the so-called hard problem of consciousness. Most neurobiologists assume that the variables giving rise to consciousness are to be found at the neuronal level, governed by classical physics, though a few scholars have proposed theories of quantum consciousness based on quantum mechanics.

Mohamad Musman thinks human now are switched on in communicating with variable conditions of end-state of universe. ***Human now is facing in front of computational mind which is actually a basis design format of universe.*** The logic is simple, if human technology has the ability to create computer algorithms to create artificial intelligence. This means that our mind also have a black box of a computer algorithm.

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We always dream of living on without an end of death, a life span of 200 years, even 1000 years, we remain young and strong. But by understanding from game theory which has a game start and end game, then a life species can be concluded as is a game, has a beautiful and great formula of game algorithms combined with probability theory of space-time travel. The hallmark of universal consciousness is only one special, universal consciousness has computational mind awareness, and humans are able to create artificial intelligence clones. This characteristic is only owned by Homo Sapiens.

1.2. We started to paint on stone

The oldest known paintings are approximately 40,000 years old, found in both the Franco-Cantabrian region in Western Europe, and in the caves in the district of Maros (Sulawesi, Indonesia). The oldest types of cave paintings are hand stencils and simple geometric shapes;

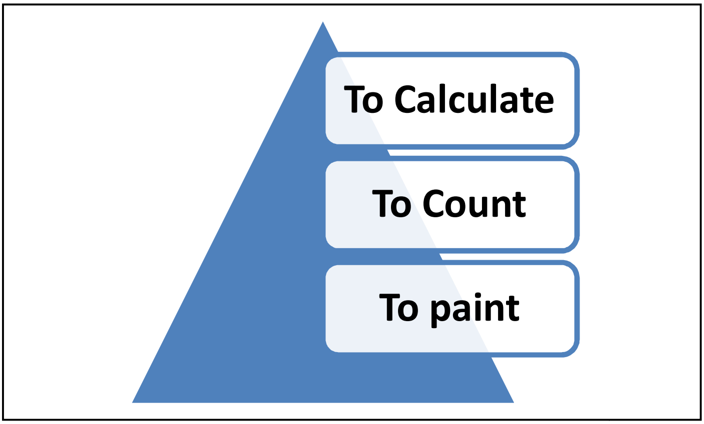
the oldest undisputed examples of figurative cave paintings are somewhat younger, close to 35,000 years old. In November 2018, scientists reported the discovery of the then-oldest known figurative art painting, over 40,000 (perhaps as old as 52,000) years old, of an unknown animal, in the cave of Lubang Jeriji Saléh on the Indonesian island of Borneo (Kalimantan). In December 2019, however, figurative cave paintings depicting pig hunting in the Maros-Pangkep karst in Sulawesi were estimated to be even older, at least 43,900 years old. The finding was noted to be "the oldest pictorial record of storytelling and the earliest figurative artwork in the world". And more recently, in 2021, cave art of a pig found in an Indonesian island, and dated to over 45,500 years, has been reported. There are examples of cave paintings all over the world—in Indonesia, France, India, Spain, Southern Africa, China, Australia etc. Various conjectures have been made as to the meaning these paintings had to the people that made them. Prehistoric artists may have painted animals to "catch" their soul or spirit in order to hunt them more easily or the paintings may represent an animistic vision and homage to surrounding nature. They may be the result of a basic need of expression that is innate to human beings, or they could have been for the transmission of practical information.

The event of universal consciousness 6000 years ago, can be imagined as we wake up from sleep at this time in dark conditions, we can imagine the process of counting 1,2,3,4,5 and so on in our mind, we can imagine 1 deer, 2 deer, then we start counting, adding, subtracting, it's all in the thought process. When we begin to imagine a counting process, an addition process, a subtraction process, the learning process from the Homo sapiens species begins.

Nearly 350 caves have now been discovered in France and Spain that contain art from prehistoric times. Initially, the age of the paintings had been a contentious issue, since methods like radiocarbon dating can produce misleading results if contaminated by other samples, and caves and rocky overhangs (where parietal art is found) are typically littered with debris from many time periods. But subsequent technology has made it possible to date the paintings by sampling the pigment itself, torch marks on the walls, or the formation of carbonate deposits on top of the paintings. The subject matter can also indicate chronology: for instance, the reindeer depicted in the Spanish cave of Cueva de las Monedas places the drawings in the last Ice Age.

The oldest known cave painting is a red hand stencil in Maltravieso cave, Cáceres, Spain. It has been dated using the uranium-thorium method to older than 64,000 years and was made by a Neanderthal. The oldest date given to an animal cave painting is now a depiction of several human figures hunting pigs in the caves in the Maros-Pangkep karst of South Sulawesi, Indonesia, dated to be over 43,900 years old. Before this, the oldest known figurative cave paintings were that of a bull dated to 40,000 years, at Lubang Jeriji Saléh cave, East Kalimantan, Borneo, and a depiction of a pig with a minimum age of 35,400 years at Timpuseng cave in Sulawesi.

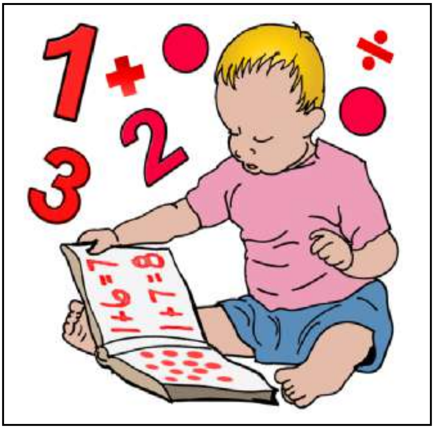
The earliest known European figurative cave paintings are those of Chauvet Cave in France, dating to earlier than 30,000 BC in the Upper Paleolithic according to radiocarbon dating. The radiocarbon dates from these samples show that there were two periods of creation in Chauvet: 35,000 years ago and 30,000 years ago.



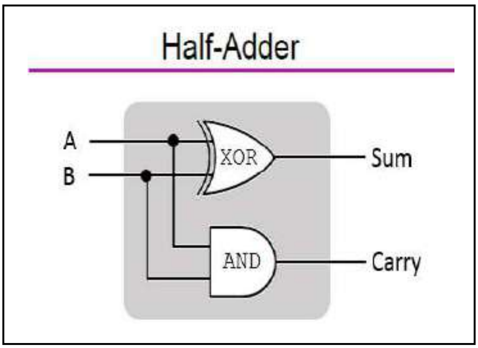
One of the surprises was that many of the paintings were modified repeatedly over thousands of years, possibly explaining the confusion about finer paintings that seemed to date earlier than cruder ones.

1.3.We started to count,add,subtract in mind

There is someone who is able to quickly calculate the amount of money in his mind, there is someone who continues to rely on a calculator. This can be a factor of talent and genetics, but the ability to count can be trained.



The result of the evolution of species makes a variability of abilities, each of which is different. In the mind, we can imagine the mathematical logic of addition, subtraction, multiplication, division.



Addition (usually signified by the plus symbol +) is one of the four basic operations of arithmetic, the other three being subtraction, multiplication and division. The addition of two whole numbers results in the total amount or sum of those values combined. The example in the adjacent image shows a combination of three apples and two apples, making a total of five apples. This observation is equivalent to the mathematical expression "3 + 2 = 5" (that is, "3 plus 2 is equal to 5"). Besides counting items, addition can also be defined and executed without referring to concrete objects, using abstractions called numbers instead, such as integers, real numbers and complex numbers. Addition belongs to arithmetic, a branch of mathematics. In algebra, another area of mathematics, addition can also be performed on abstract objects such as vectors, matrices, subspaces and subgroups.

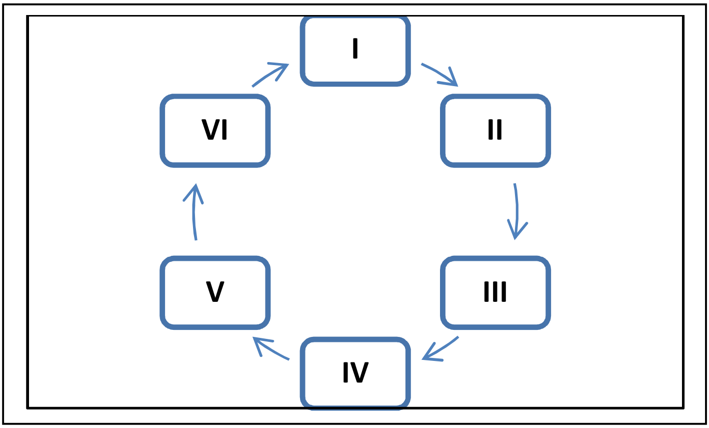
Addition has several important properties. It is commutative, meaning that order does not matter, and it is associative, meaning that when one adds more than two numbers, the order in which addition is performed does not matter (see Summation). Repeated addition of 1 is the same as counting; addition of 0 does not change a number. Addition also obeys predictable rules concerning related operations such as subtraction and multiplication.

Performing addition is one of the simplest numerical tasks. Addition of very small numbers is accessible to toddlers; the most basic task, 1 + 1, can be performed by infants as young as five months, and even some members of other animal species. In primary education, students are taught to add numbers in the decimal system, starting with single digits and progressively tackling more difficult problems. Mechanical aids range from the ancient abacus to the modern computer, where research on the most efficient implementations of addition continues to this day.

The alphabet of human thought is a concept originally proposed by Gottfried Wilhelm Leibniz that provides a universal way to represent and analyze ideas and relationships by breaking down their component pieces. All ideas are compounded from a very small number of simple ideas which can be represented by a unique character.

Logic was Leibniz's earliest philosophic interest, going back to his teens. René Descartes had suggested that the lexicon of a universal language should consist of primitive elements. The systematic combination of these elements, according to syntactical rules, would generate the infinite combinations of computational structures required to represent human language. In this way Descartes and Leibniz were precursors to computational linguistics as defined by Noam Chomsky.

In the early 18th century, Leibniz outlined his characteristica universalis, an artificial language in which grammatical and logical structure would coincide, which would allow reasoning to be reduced to calculation. Leibniz acknowledged the work of Ramon Llull, particularly the Ars generalis ultima (1305), as one of the inspirations for this idea. The basic elements of his characteristica would be pictographic characters representing unambiguously a limited number of elementary concepts.



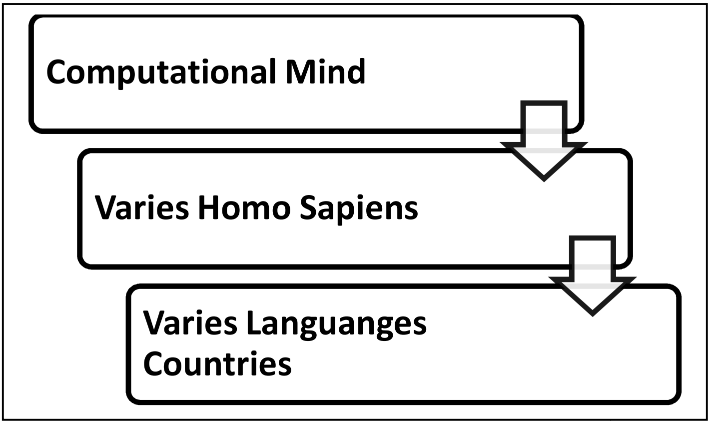
Leibniz called the inventory of these concepts "the alphabet of human thought." There are quite a few mentions of the characteristica in Leibniz's writings, but he never set out any details save for a brief outline of some possible sentences in his Dissertation on the Art of Combinations.

Let's take example Leibniz thought, "God is an absolutely perfect being". He describes this perfection later in section VI as the simplest form of something with the most substantial outcome (VI). Along these lines, he declares that every type of perfection "pertains to him (God) in the highest degree" (I). Even though his types of perfections are not specifically drawn out, Leibniz highlights the one thing that, to him, does certify imperfections and proves that God is perfect: "that one acts imperfectly if he acts with less perfection than he is capable of", and since God is a perfect being, he cannot act imperfectly (III). Because God cannot act imperfectly, the decisions he makes pertaining to the world must be perfect. Leibniz also comforts readers, stating that because he has done everything to the most perfect degree; those who love him cannot be injured. However, to love God is a subject of difficulty as Leibniz believes that we are "not disposed to wish for that which God desires" because we have the ability to alter our disposition (IV). In accordance with this, many act as rebels, but Leibniz says that the only way we can truly love God is by being content "with all that comes to us according to his will" (IV).

Because God is "an absolutely perfect being" (I), Leibniz argues that God would be acting imperfectly if he acted with any less perfection than what he is able of (III). His syllogism then ends with the statement that God has made the world perfectly in all ways. This also affects how we should view God and his will. Leibniz states that, in lieu of God's will, we have to understand that God "is the best of all masters" and he will know when his good succeeds, so we, therefore, must act in conformity to his good will—or as much of it as we understand (IV). In our view of God, Leibniz declares that we cannot admire the work solely because of the maker, lest we mar the glory and love God in doing so. Instead, we must admire the maker for the work he has done (II). Effectively, Leibniz states that if we say the earth is good because of the will of God, and not good according to some standards of goodness, then how can we praise God for what he has done if contrary actions are also praiseworthy by this definition (II).

Leibniz then asserts that different principles and geometry cannot simply be from the will of God, but must follow from his understanding.

Computational linguistics is an interdisciplinary field concerned with the computational modelling of natural language, as well as the study of appropriate computational approaches to linguistic questions. In general, computational linguistics draws upon linguistics, computer science, artificial intelligence, mathematics, logic, philosophy, cognitive science, cognitive psychology, psycholinguistics, anthropology and neuroscience, among oth Computational linguistics is often grouped within the field of artificial intelligence but was present before the development of artificial intelligence.



Computational linguistics originated with efforts in the United States in the 1950s to use computers to automatically translate texts from foreign languages, particularly Russian scientific journals, into English. Since computers can make arithmetic (systematic) calculations much faster and more accurately than humans, it was thought to be only a short matter of time before they could also begin to process language. Computational and quantitative methods are also used historically in the attempted reconstruction of earlier forms of modern languages and sub-grouping modern languages into language families. Earlier methods, such as lexicostatistics and glottochronology, have been proven to be premature and inaccurate. However, recent interdisciplinary studies that borrow concepts from biological studies, especially gene mapping, have proved to produce more sophisticated analytical tools and more reliable results.

When machine translation (also known as mechanical translation) failed to yield accurate translations right away, automated processing of human languages was recognized as far more complex than had originally been assumed. Computational linguistics was born as the name of the new field of study devoted to developing algorithms and software for intelligently processing language data. The term "computational linguistics" itself was first coined by David Hays, a founding member of both the Association for Computational Linguistics (ACL) and the International Committee on Computational Linguistics (ICCL).

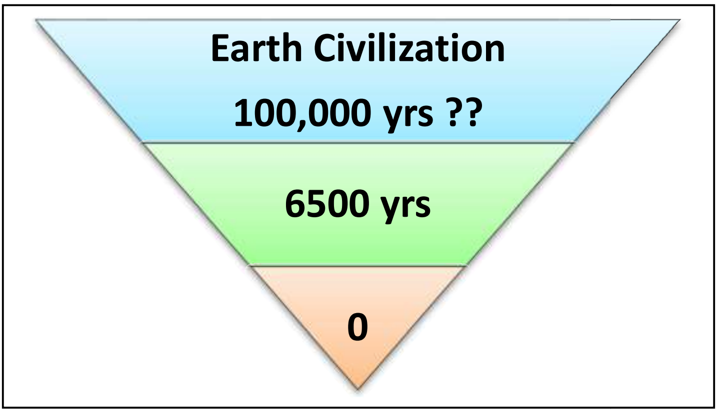
To translate one language into another, it was observed that one had to understand the grammar of both languages, including both morphology (the grammar of word forms) and syntax (the grammar of sentence structure). To understand syntax, one had to also understand the semantics and the lexicon (or 'vocabulary'), and even something of the pragmatics of language use. Thus, what started as an effort to translate between languages evolved into an entire discipline devoted to understanding how to represent and process natural languages using computers.

Nowadays research within the scope of computational linguistics is done at computational linguistics departments, computational linguistics laboratories, computer science departments, and linguistics departments. Some research in the field of computational linguistics aims to create working speech or text processing systems while others aim to create a system allowing human-machine interaction. Programs meant for human-machine communication are called conversational agentsers.

We can make addition, subtraction, multiplication function processors for a computer, but looking for evidence that there is a processor component in our brain neurons, this seems an impossible task for humans.

1.4. We started a civilization to see Universe

If humans appear, it is certain that civilization will emerge in all its complexity. Because civilization is related to the writing of human history, the written history of human activity is the starting point of civilization.



About 6000 years ago, human civilization emerged, while we know the age of the universe was 13.8 billion years ago. Why do humans seem to suddenly appear this fast? This is the big question. Whether civilization will reach the age of 100,000 years, this too is still a question.

A civilization (or civilisation) is a complex society that is characterized by urban development, social stratification, a form of government, and symbolic systems of communication (such as writing).

Civilizations are intimately associated with and often have characteristics such as centralization, the domestication of plant and animal species, specialization of labour, culturally-ingrained ideologies of progress and supremacism, monumental architecture, taxation, societal dependence upon farming and expansionism.

Historically, "a civilization" has often been understood as a larger and "more advanced" culture, in implied contrast to smaller, supposedly primitive cultures. In this broad sense, a civilization contrasts with non-centralized tribal societies, including the cultures of nomadic pastoralists, Neolithic societies or hunter-gatherers; however, sometimes it also contrasts with the cultures found within civilizations themselves. Civilizations are organized densely-populated settlements divided into hierarchical social classes with a ruling elite and subordinate urban and rural populations, which engage in intensive agriculture, mining, small-scale manufacture and trade. Civilization concentrates power, extending human control over the rest of nature, including over other human beings.

Civilization, as its etymology suggests, is a concept originally associated with towns and cities. The earliest emergence of civilizations is generally connected with the final stages of the Neolithic Revolution, culminating in the relatively rapid process of urban revolution and state-formation, a political development associated with the appearance of a governing elite.

A group of theorists, making use of systems theory, looks at a civilization as a complex system, i.e., a framework by which a group of objects can be analysed that work in concert to produce some result. Civilizations can be seen as networks of cities that emerge from pre-urban cultures and are defined by the economic, political, military, diplomatic, social and cultural interactions among them. Any organization is a complex social system and a civilization is a large organization. Systems theory helps guard against superficial and misleading analogies in the study and description of civilizations.

Systems theorists look at many types of relations between cities, including economic relations, cultural exchanges and political/diplomatic/military relations. These spheres often occur on different scales. For example, trade networks were, until the nineteenth century, much larger than either cultural spheres or political spheres. Extensive trade routes, including the Silk Road through Central Asia and Indian Ocean sea routes linking the Roman Empire, Persian Empire, India and China, were well established 2000 years ago when these civilizations scarcely shared any political, diplomatic, military, or cultural relations. The first evidence of such long-distance trade is in the ancient world. During the Uruk period, Guillermo Algaze has argued that trade relations connected Egypt, Mesopotamia, Iran and Afghanistan. Resin found later in the Royal Cemetery at Ur is suggested was traded northwards from Mozambique.

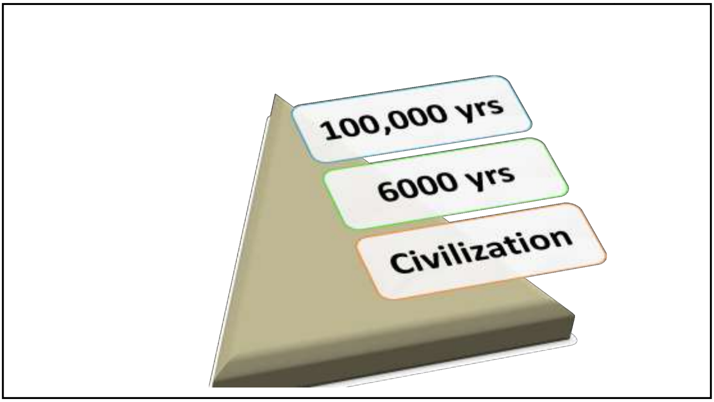
Many theorists argue that the entire world has already become integrated into a single "world system", a process known as globalization. Different civilizations and societies all over the globe are economically, politically, and even culturally interdependent in many ways. There is debate over when this integration began, and what sort of integration – cultural, technological, economic, political, or military-diplomatic – is the key indicator in determining the extent of a civilization. David Wilkinson has proposed that economic and military-diplomatic integration of the Mesopotamian and Egyptian civilizations resulted in the creation of what he calls the "Central Civilization" around 1500 BC. Central Civilization later expanded to include the entire Middle East and Europe, and then expanded to a global scale with European colonization, integrating the Americas, Australia, China and Japan by the nineteenth century. According to Wilkinson, civilizations can be culturally heterogeneous, like the Central Civilization, or homogeneous, like the Japanese civilization. What Huntington calls the "clash of civilizations" might be characterized by Wilkinson as a clash of cultural spheres within a single global civilization. Others point to the Crusades as the first step in globalization. The more conventional viewpoint is that networks of societies have expanded and shrunk since ancient times, and that the current globalized economy and culture is a product of recent European colonialism.

Civilization has been spread by colonization, invasion, religious conversion, the extension of bureaucratic control and trade, and by introducing agriculture and writing to non-literate peoples. Some non-civilized people may willingly adapt to civilized behaviour. But civilization is also spread by the technical, material and social dominance that civilization engenders.

Assessments of what level of civilization a polity has reached are based on comparisons of the relative importance of agricultural as opposed to trading or manufacturing capacities, the territorial extensions of its power, the complexity of its division of labour, and the carrying capacity of its urban centres.

Secondary elements include a developed transportation system, writing, standardized measurement, currency, contractual and tort-based legal systems, art, architecture, mathematics, scientific understanding, metallurgy, political structures, and organized religion.

Traditionally, polities that managed to achieve notable military, ideological and economic power defined themselves as "civilized" as opposed to other societies or human groupings outside their sphere of influence – calling the latter barbarians, savages, and primitives.



Political scientist Samuel Huntington has argued that the defining characteristic of the 21st century will be a clash of civilizations. According to Huntington, conflicts between civilizations will supplant the conflicts between nation-states and ideologies that characterized the 19th and 20th centuries. These views have been strongly challenged by others like Edward Said, Muhammed

Asadi and Amartya Sen. Ronald Inglehart and Pippa Norris have argued that the "true clash of civilizations" between the Muslim world and the West is caused by the Muslim rejection of the West's more liberal sexual values, rather than a difference in political ideology, although they note that this lack of tolerance is likely to lead to an eventual rejection of (true) democracy.

Cultural Historian Morris Berman suggests in Dark Ages America: the End of Empire that in the corporate consumerist United States, the very factors that once propelled it to greatness—extreme individualism, territorial and economic expansion, and the pursuit of material wealth—have pushed the United States across a critical threshold where collapse is inevitable. Politically associated with over-reach, and as a result of the environmental exhaustion and polarization of wealth between rich and poor, he concludes the current system is fast arriving at a situation where continuation of the existing system saddled with huge deficits and a hollowed-out economy is physically, socially, economically and politically impossible. Although developed in much more depth, Berman's thesis is similar in some ways to that of Urban Planner, Jane Jacobs who argues that the five pillars of United States culture are in serious decay: community and family; higher education; the effective practice of science; taxation and government; and the self-regulation of the learned professions.

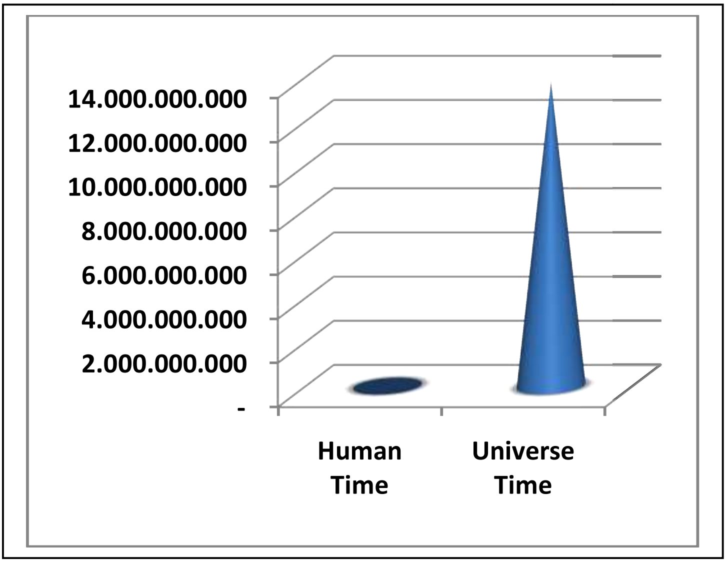
Cultural critic and author Derrick Jensen argues that modern civilization is directed towards the domination of the environment and humanity itself in an intrinsically harmful, unsustainable, and self-destructive fashion. Defending his definition both linguistically and historically, he defines civilization as "a culture... that both leads to and emerges from the growth of cities", with "cities" defined as "people living more or less permanently in one place in densities high enough to require the routine importation of food and other necessities of life". This need for civilizations to import ever more resources, he argues, stems from their over-exploitation and diminution of their own local resources. Therefore, civilizations inherently adopt imperialist and expansionist policies and, to maintain these, highly militarized, hierarchically structured, and coercion-based cultures and lifestyles.

The Kardashev scale classifies civilizations based on their level of technological advancement, specifically measured by the amount of energy a civilization is able to harness. The scale is only hypothetical, but it puts energy consumption in a cosmic perspective. The Kardashev scale makes provisions for civilizations far more technologically advanced than any currently known to exist.

II. What was happened 13.8 billion years ago?

2.1. Future of 13.8 billion years are not ours

When currently human civilization realizes that civilization seems to have been born suddenly just yesterday, it is as if the awareness of the universe was awakened by a precise and accurate time setting. But it's as if we have a long lifespan the total time is 13.8 billion years. If we compare the age of civilization of 6000 years with the age of the cosmos of 13.8 billion years, it is clear that human civilization is the setting base point.



While the future cannot be predicted with certainty, present understanding in various scientific fields allows for the prediction of some far-future events, if only in the broadest outline. These fields include astrophysics, which has revealed how planets and stars form, interact, and die; particle physics, which has revealed how matter behaves at the smallest scales; evolutionary biology, which predicts how life will evolve over time; and plate tectonics, which shows how continents shift over millennia.

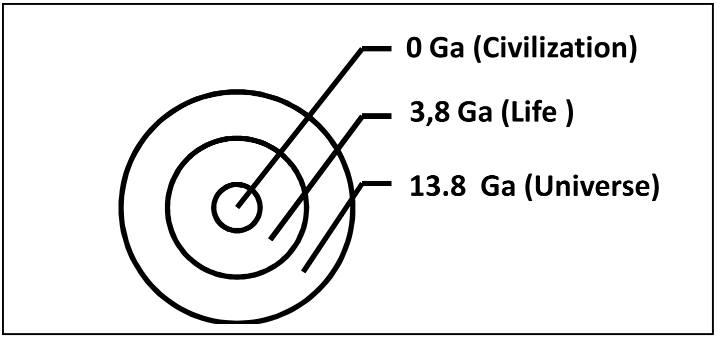
The timelines displayed here cover events from the beginning of the 4th millennium to the furthest reaches of future time. A number of alternative future events are listed to account for questions still unresolved, such as whether humans will become extinct, whether protons decay, and whether the Earth survives when the Sun expands to become a red giant.

All projections of the future of Earth, the Solar System, and the universe must account for the second law of thermodynamics, which states that entropy, or a loss of the energy available to do work, must rise over time. Stars will eventually exhaust their supply of hydrogen fuel and burn out. Close encounters between astronomical objects gravitationally fling planets from their star systems, and star systems from galaxies.

Physicists expect that matter itself will eventually come under the influence of radioactive decay, as even the most stable materials break apart into subatomic particles. Current data suggest that the universe has a flat geometry (or very close to flat), and thus will not collapse in on itself after a finite time, and the infinite future allows for the occurrence of a number of massively improbable events, such as the formation of Boltzmann brains.

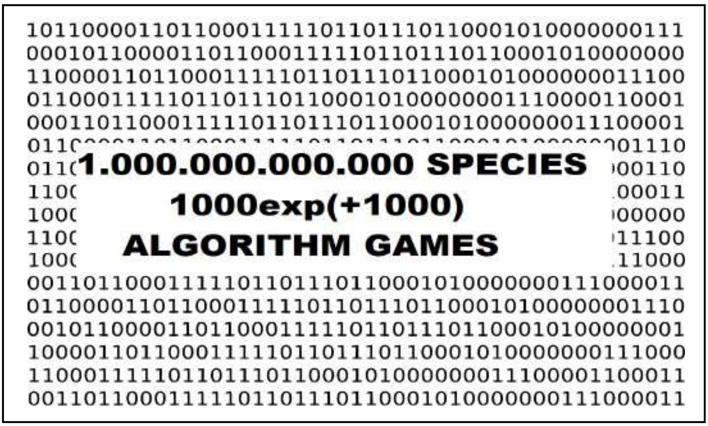
2.2.Why Earth life evolution have 3.8 Billion yrs?.

The history of life on Earth traces the processes by which living and fossil organisms evolved, from the earliest emergence of life to present day. Earth formed about 4.5 billion years ago (abbreviated as Ga, for gigaannum) and evidence suggests that life emerged prior to 3.7 Ga.



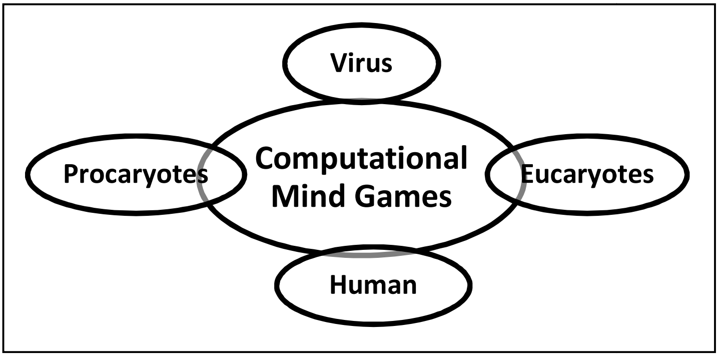
(Although there is some evidence of life as early as 4.1 to 4.28 Ga, it remains controversial due to the possible non-biological formation of the purported fossils. The similarities among all known present-day species indicate that they have diverged through the process of evolution from a common ancestor. Approximately 1 trillion species currently live on Earth of which only 1.75–1.8 million have been named and 1.8 million documented in a central database. These currently living species represent less than one percent of all species that have ever lived on Earth.

The earliest evidence of life comes from biogenic carbon signatures and stromatolite fossils discovered in 3.7 billion-year-old metasedimentary rocks from western Greenland. In 2015, possible "remains of biotic life" were found in 4.1 billion-year-old rocks in Western Australia.



In March 2017, putative evidence of possibly the oldest forms of life on Earth was reported in the form of fossilized microorganisms discovered in hydrothermal vent precipitates in the Nuvvuagittuq Belt of Quebec, Canada, that may have lived as early as 4.28 billion years ago, not long after the oceans formed 4.4 billion years ago, and not long after the formation of the Earth 4.54 billion years ago.

The earliest identified organisms were minute and relatively featureless, and their fossils look like small rods that are very difficult to tell apart from structures that arise through abiotic physical processes. The oldest undisputed evidence of life on Earth, interpreted as fossilized bacteria, dates to 3 Ga. Other finds in rocks dated to about 3.5 Ga have been interpreted as bacteria, with geochemical evidence also seeming to show the presence of life 3.8 Ga. However, these analyses were closely scrutinized, and non-biological processes were found which could produce all of the "signatures of life" that had been reported. While this does not prove that the structures found had a non-biological origin, they cannot be taken as clear evidence for the presence of life.



Geochemical signatures from rocks deposited 3.4 Ga have been interpreted as evidence for life, although these statements have not been thoroughly examined by critics.

Evidence for fossilized microorganisms considered to be 3.77 billion to 4.28 billion years old was found in the Nuvvuagittuq Greenstone Belt in Quebec, Canada, although the evidence is disputed as inconclusive.

This timeline of the evolutionary history of life represents the current scientific theory outlining the major events during the development of life on planet Earth. In biology, evolution is any change across successive generations in the heritable characteristics of biological populations. Evolutionary processes give rise to diversity at every level of biological organization, from kingdoms to species, and individual organisms and molecules, such as DNA and proteins. The similarities between all present day organisms indicate the presence of a common ancestor from which all known species, living and extinct, have diverged through the process of evolution. More than 99 percent of all species, amounting to over five billion species, that ever lived on Earth are estimated to be extinct. Estimates on the number of Earth's current species range from 10 million to 14 million, of which about 1.2 million have been documented and over 86 percent have not yet been described. However, a May 2016 scientific report estimates that 1 trillion species are currently on Earth, with only one-thousandth of one percent described.

While the dates given in this article are estimates based on scientific evidence, there has been controversy between more traditional views of increased biodiversity through a cone of diversity with the passing of time and the view that the basic pattern on Earth has been one of annihilation and diversification and that in certain past times, such as the Cambrian explosion, there was great diversity.

The history of Earth concerns the development of planet Earth from its formation to the present day. Nearly all branches of natural science have contributed to understanding of the main events of Earth's past, characterized by constant geological change and biological evolution.

The geological time scale (GTS), as defined by international convention, depicts the large spans of time from the beginning of the Earth to the present, and its divisions chronicle some definitive events of Earth history. (In the graphic, Ma means "million years ago".) Earth formed around 4.54 billion years ago, approximately one-third the age of the universe, by accretion from the solar nebula. Volcanic outgassing probably created the primordial atmosphere and then the ocean, but the early atmosphere contained almost no oxygen. Much of the Earth was molten because of frequent collisions with other bodies which led to extreme volcanism. While the Earth was in its earliest stage (Early Earth), a giant impact collision with a planetsized body named Theia is thought to have formed the Moon. Over time, the Earth cooled, causing the formation of a solid crust, and allowing liquid water on the surface.

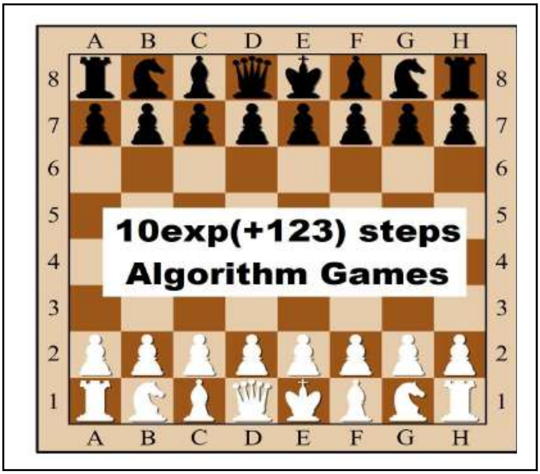
The Hadean eon represents the time before a reliable (fossil) record of life; it began with the formation of the planet and ended 4.0 billion years ago. The following Archean and Proterozoic eons produced the beginnings of life on Earth and its earliest evolution. The succeeding eon is the Phanerozoic, divided into three eras: the Palaeozoic, an era of arthropods, fishes, and the first life on land; the Mesozoic, which spanned the rise, reign, and climactic extinction of the non-avian dinosaurs; and the Cenozoic, which saw the rise of mammals. Recognizable humans emerged at most 2 million years ago, a vanishingly small period on the geological scale.

The earliest undisputed evidence of life on Earth dates at least from 3.5 billion years ago, during the Eoarchean Era, after a geological crust started to solidify following the earlier molten Hadean Eon. There are microbial mat fossils such as stromatolites found in 3.48 billion-year-old sandstone discovered in Western Australia. Other early physical evidence of a biogenic substance is graphite in 3.7 billion-year-old metasedimentary rocks discovered in southwestern Greenland as well as "remains of biotic life" found in 4.1 billion-year-old rocks in Western Australia. According to one of the researchers, "If life arose relatively quickly on Earth ... then it could be common in the universe."

Photosynthetic organisms appeared between 3.2 and 2.4 billion years ago and began enriching the atmosphere with oxygen. Life remained mostly small and microscopic until about 580 million years ago, when complex multicellular life arose, developed over time, and culminated in the Cambrian Explosion about 541 million years ago. This sudden diversification of life forms produced most of the major phyla known today, and divided the Proterozoic Eon from the Cambrian Period of the Paleozoic Era. It is estimated that 99 percent of all species that ever lived on Earth, over five billion, have gone extinct. Estimates on the number of Earth's current species range from 10 million to 14 million, of which about 1.2 million are documented, but over 86 percent have not been described. However, it was recently claimed that 1 trillion species currently live on Earth, with only one-thousandth of one percent described.

2.3.Mind creates mathematical games model

Mathematical models can take many forms, including dynamical systems, statistical models, differential equations, or game theoretic models. These and other types of models can overlap, with a given model involving a variety of abstract structures. In general, mathematical models may include logical models. In many cases, the quality of a scientific field depends on how well the mathematical models developed on the theoretical side agree with results of repeatable experiments. Lack of agreement between theoretical mathematical models and experimental measurements often leads to important advances as better theories are developed.



A mathematical chess problem is a mathematical problem which is formulated using a chessboard and chess pieces. These problems belong to recreational mathematics. The most known problems of this kind are Eight queens puzzle or Knight's Tour problems, which have connection to graph theory and combinatorics. Many famous mathematicians studied mathematical chess problems; for example, Thabit, Euler, Legendre and Gauss. Besides finding a solution to a particular problem, mathematicians are usually interested in counting the total number of possible solutions, finding solutions with certain properties, as well as generalization of the problems to N×N or rectangular boards.

The game structure and nature of chess are related to several branches of mathematics. Many combinatorical and topological problems connected to chess, such as the knight's tour and the eight queens puzzle, have been known for hundreds of years.

The number of legal positions in chess is estimated to be about 10exp43, and has been proved to be fewer than 10exp47, with a game-tree complexity of approximately 10exp123. The game-tree complexity of chess was first calculated by Claude Shannon as 10exp120, a number known as the Shannon number. An average position typically has thirty to forty possible moves, but there may be as few as zero (in the case of checkmate or stalemate) or (in a constructed position) as many as 218.

In 1913, Ernst Zermelo used chess as a basis for his theory of game strategies, which is considered as one of the predecessors of game theory. Zermelo's theorem states that it is possible to solve chess, i.e. to determine with certainty the outcome of a perfectly played game (either White can force a win, or Black can force a win, or both sides can force at least a draw). Of course with 10exp43 legal positions in chess, it will take an impossibly long time to compute a perfect strategy with any feasible technology.

Chess computers were first able to beat strong chess players in the late 1980s. Their most famous success was the victory of Deep Blue over then World Chess Champion Garry Kasparov in 1997, but there was some controversy over whether the match conditions favored the computer.

In 2002–2003, three human–computer matches were drawn, but whereas Deep Blue was a specialized machine, these were chess programs running on commercially available computers.

Chess programs running on commercially available desktop computers won decisive victories against human players in matches in 2005 and 2006. The second of these, against then world champion Vladimir Kramnik is (as of 2019) the last major human-computer match.

Since that time, chess programs running on commercial hardware—more recently including mobile phones—have been able to defeat even the strongest human players.

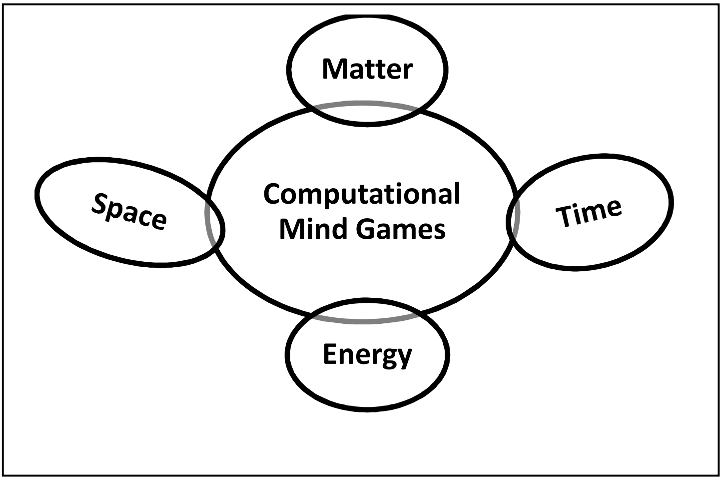
2.4.Mind shows algorithm over matter and energy

If life of the universe is just a game of mathematical algorithms, then the game complexities of mathematical computation is the main, while matter, energy, space, and time are mere accessories. ***Matter and energy algorithms are needed to create longer space-time travel.***

Let's follow questions of why universe timetable requires 13.8 billion years. Most observations suggest that the expansion of the universe will continue forever. If so, then a popular theory is that the universe will cool as it expands, eventually becoming too cold to sustain life. For this reason, this future scenario once popularly called "Heat Death" is now known as the "Big Chill" or "Big Freeze".

If dark energy—represented by the cosmological constant, a constant energy density filling space homogeneously, or scalar fields, such as quintessence or moduli, dynamic quantities whose energy density can vary in time and space—accelerates the expansion of the universe, then the space between clusters of galaxies will grow at an increasing rate. Redshift will stretch ancient, incoming photons (even gamma rays) to undetectably long wavelengths and low energies. Stars are expected to form normally for 10exp12 to 10exp14 (1–100 trillion) years, but eventually the supply of gas needed for star formation will be exhausted. As existing stars run out of fuel and cease to shine, the universe will slowly and inexorably grow darker. According to theories that predict proton decay, the stellar remnants left behind will disappear, leaving behind only black holes, which themselves eventually disappear as they emit Hawking radiation. Ultimately, if the universe reaches thermodynamic equilibrium, a state in which the temperature approaches a uniform value, no further work will be possible, resulting in a final heat death of the universe

Infinite expansion does not determine the overall spatial curvature of the universe. It can be open (with negative spatial curvature), flat, or closed (positive spatial curvature), although if it is closed, sufficient dark energy must be present to counteract the gravitational forces or else the universe will end in a Big Crunch.



Observations of the cosmic background radiation by the Wilkinson Microwave Anisotropy Probe and the Planck mission suggest that the universe is spatially flat and has a significant amount of dark energy. In this case, the universe should continue to expand at an accelerating rate. The acceleration of the universe's expansion has also been confirmed by observations of distant supernovae. If, as in the concordance model of physical cosmology (Lambda-cold dark matter or ΛCDM), dark energy is in the form of a cosmological constant, the expansion will eventually become exponential, with the size of the universe doubling at a constant rate.

If the theory of inflation is true, the universe went through an episode dominated by a different form of dark energy in the first moments of the Big Bang; but inflation ended, indicating an equation of state much more complicated than those assumed so far for present-day dark energy. It is possible that the dark energy equation of state could change again resulting in an event that would have consequences which are extremely difficult to parametrize or predict.

In the 1970s, the future of an expanding universe was studied by the astrophysicist Jamal Islam and the physicist Freeman Dyson. Then, in their 1999 book The Five Ages of the Universe, the astrophysicists Fred Adams and Gregory Laughlin divided the past and future history of an expanding universe into five eras. The first, the Primordial Era, is the time in the past just after the Big Bang when stars had not yet formed. The second, the Stelliferous Era, includes the present day and all of the stars and galaxies now seen. It is the time during which stars form from collapsing clouds of gas. In the subsequent Degenerate Era, the stars will have burnt out, leaving all stellar-mass objects as stellar remnants—white dwarfs, neutron stars, and black holes. In the Black Hole Era, white dwarfs, neutron stars, and other smaller astronomical objects have been destroyed by proton decay, leaving only black holes. Finally, in the Dark Era, even black holes have disappeared, leaving only a dilute gas of photons and leptons.

This future history and the timeline assume the continued expansion of the universe. If space in the universe begins to contract, subsequent events in the timeline may not occur because the Big Crunch, the collapse of the universe into a hot, dense state similar to that after the Big Bang, will supervene

The observable universe is currently 1.38x10(exp)10 (13.8 billion) years old. This time is in the Stelliferous Era. About 155 million years after the Big Bang, the first star formed. Since then, stars have formed by the collapse of small, dense core regions in large, cold molecular clouds of hydrogen gas. At first, this produces a protostar, which is hot and bright because of energy generated by gravitational contraction. After the protostar contracts for a while, its center will become hot enough to fuse hydrogen and its lifetime as a star will properly begin.

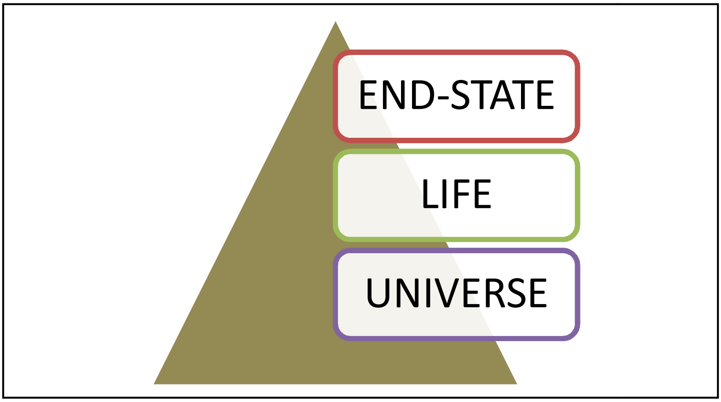
Stars of very low mass will eventually exhaust all their fusible hydrogen and then become helium white dwarfs. Stars of low to medium mass, such as our own sun, will expel some of their mass as a planetary nebula and eventually become white dwarfs; more massive stars will explode in a core-collapse supernova, leaving behind neutron stars or black holes. In any case, although some of the star's matter may be returned to the interstellar medium, a degenerate remnant will be left behind whose mass is not returned to the interstellar medium. Therefore, the supply of gas available for star formation is steadily being exhausted.

The Big Bang theory is the prevailing cosmological model explaining the existence of the observable universe from the earliest known periods through its subsequent large-scale evolution. The model describes how the universe expanded from an initial state of high density and temperature, and offers a comprehensive explanation for a broad range of observed phenomena, including the abundance of light elements, the cosmic microwave background (CMB) radiation, and large-scale structure. Crucially, the theory is compatible with Hubble–Lemaître law—the observation that the farther away a galaxy is, the faster it is moving away from Earth. Extrapolating this cosmic expansion backwards in time using the known laws of physics, the theory describes an increasingly concentrated cosmos preceded by a singularity in which space and time lose meaning (typically named "the Big Bang singularity"). Detailed measurements of the expansion rate of the universe place the Big Bang singularity at around 13.8 billion years ago, which is thus considered the age of the universe.

After its initial expansion, an event that is by itself often called "the Big Bang", the universe cooled sufficiently to allow the formation of subatomic particles, and later atoms. Giant clouds of these primordial elements—mostly hydrogen, with some helium and lithium—later coalesced through gravity, forming early stars and galaxies, the descendants of which are visible today. Besides these primordial building materials, astronomers observe the gravitational effects of an unknown dark matter surrounding galaxies. Most of the gravitational potential in the universe seems to be in this form, and the Big Bang theory and various observations indicate that this excess gravitational potential is not created by baryonic matter, such as normal atoms. Measurements of the redshifts of supernovae indicate that the expansion of the universe is accelerating, an observation attributed to dark energy's existence.

Georges Lemaître first noted in 1927 that an expanding universe could be traced back in time to an originating single point, which he called the "primeval atom". Edwin Hubble confirmed through analysis of galactic redshifts in 1929 that galaxies are indeed drifting apart; this is important observational evidence for an expanding universe. For several decades, the scientific community was divided between supporters of the Big Bang and the rival steady-state model which both offered explanations for the observed expansion, but the steady-state model stipulated an eternal universe in contrast to the Big Bang's finite age. In 1964, the CMB was discovered, which convinced many cosmologists that the steady-state theory was falsified,[8] since, unlike the steady-state theory, the hot Big Bang predicted a uniform background radiation throughout the universe caused by the high temperatures and densities in the distant past. A wide range of empirical evidence strongly favors the Big Bang, which is now essentially universally accepted.

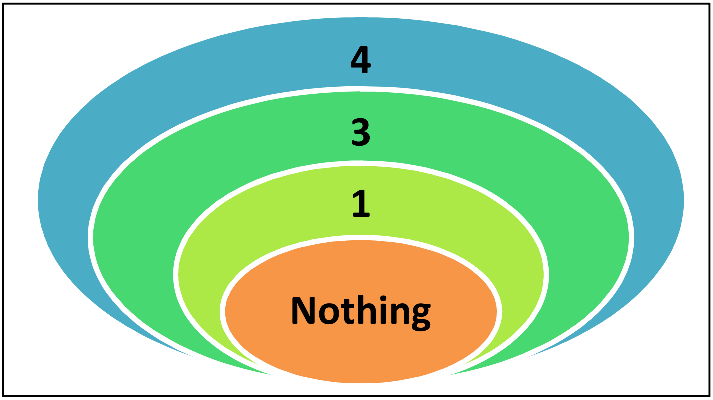
The Big Bang theory offers a comprehensive explanation for a broad range of observed phenomena, including the abundances of the light elements, the CMB, large-scale structure, and Hubble's law. The theory depends on two major assumptions: the universality of physical laws and the cosmological principle. The universality of physical laws is one of the underlying principles of the theory of relativity. The cosmological principle states that on large scales the universe is homogeneous and isotropic—appearing the same in all directions regardless of location. These ideas were initially taken as postulates, but later efforts were made to test each of them. For example, the first assumption has been tested by observations showing that largest possible deviation of the fine-structure constant over much of the age of the universe is of order 10−5. Also, general relativity has passed stringent tests on the scale of the Solar System and binary stars.



The large-scale universe appears isotropic as viewed from Earth. If it is indeed isotropic, the cosmological principle can be derived from the simpler Copernican principle, which states that there is no preferred (or special) observer or vantage point. To this end, the cosmological principle has been confirmed to a level of 10−5 via observations of the temperature of the CMB. At the scale of the CMB horizon, the universe has been measured to be homogeneous with an upper bound on the order of 10% inhomogeneity, as of 1995.

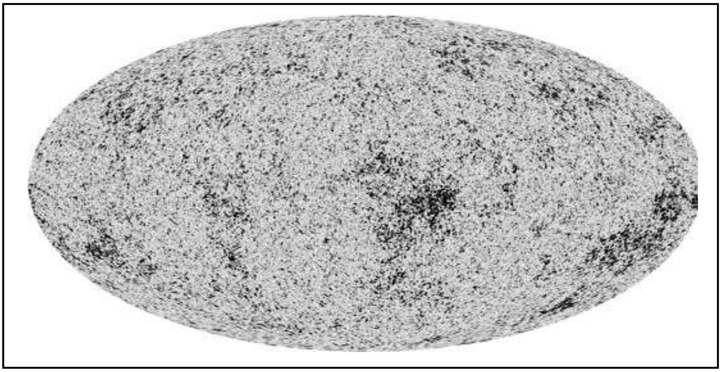
III. What will happen future of human civiliztion?

3.1.Human-sciences predict Big Crunch Big Rip



The ultimate fate of the universe is a topic in physical cosmology, whose theoretical restrictions allow possible scenarios for the evolution and ultimate fate of the universe to be described and evaluated. Based on available observational evidence, deciding the fate and evolution of the universe has become a valid cosmological question, being beyond the mostly untestable constraints of mythological or theological beliefs.

Several possible futures have been predicted by different scientific hypotheses, including that the universe might have existed for a finite and infinite duration, or towards explaining the manner and circumstances of its beginning. Observations made by Edwin Hubble during the 1920s–1950s found that galaxies appeared to be moving away from each other, leading to the currently accepted Big Bang theory. This suggests that the universe began – very small and very dense – about 13.82 billion years ago, and it has expanded and (on average) become less dense ever since.



Confirmation of the Big Bang mostly depends on knowing the rate of expansion, average density of matter, and the physical properties of the mass–energy in the universe. There is a strong consensus among cosmologists that the shape of the universe is considered "flat" and will continue to expand forever.

Factors that need to be considered in determining the universe's origin and ultimate fate include the average motions of galaxies, the shape and structure of the universe, and the amount of dark matter and dark energy that the universe contains.
The fate of the universe is determined by its density. The preponderance of evidence to date, based on

measurements of the rate of expansion and the mass density, favors a universe that will continue to expand indefinitely, resulting in the "Big Freeze" scenario below. However, observations are not conclusive, and alternative models are still possible.

The Big Freeze (or Big Chill) is a scenario under which continued expansion results in a universe that asymptotically approaches absolute zero temperature. This scenario, in combination with the Big Rip scenario, is gaining ground as the most important hypothesis. It could, in the absence of dark energy, occur only under a flat or hyperbolic geometry. With a positive cosmological constant, it could also occur in a closed universe. In this scenario, stars are expected to form normally for 1012 to 1014 (1–100 trillion) years, but eventually the supply of gas needed for star formation will be exhausted. As existing stars run out of fuel and cease to shine, the universe will slowly and inexorably grow darker. Eventually black holes will dominate the universe, which themselves will disappear over time as they emit Hawking radiation. Over infinite time, there would be a spontaneous entropy decrease by the Poincaré recurrence theorem, thermal fluctuations, and the fluctuation theorem.

A related scenario is heat death, which states that the universe goes to a state of maximum entropy in which everything is evenly distributed and there are no gradients—which are needed to sustain information processing, one form of which is life. The heat death scenario is compatible with any of the three spatial models, but requires that the universe reach an eventual temperature minimum.

The current Hubble constant defines a rate of acceleration of the universe not large enough to destroy local structures like galaxies, which are held together by gravity, but large enough to increase the space between them. A steady increase in the Hubble constant to infinity would result in all material objects in the universe, starting with galaxies and eventually (in a finite time) all forms, no matter how small, disintegrating into unbound elementary particles, radiation and beyond. As the energy density, scale factor and expansion rate become infinite the universe ends as what is effectively a singularity.

In the special case of phantom dark energy, which has supposed negative kinetic energy that would result in a higher rate of acceleration than other cosmological constants predict, a more sudden big rip could occur.

The Big Crunch hypothesis is a symmetric view of the ultimate fate of the universe. Just as the Big Bang started as a cosmological expansion, this theory assumes that the average density of the universe will be enough to stop its expansion and the universe will begin contracting. The end result is unknown; a simple estimation would have all the matter and space-time in the universe collapse into a dimensionless singularity back into how the universe started with the Big Bang, but at these scales unknown quantum effects need to be considered (see Quantum gravity). Recent evidence suggests that this scenario is unlikely but has not been ruled out, as measurements have been available only over a short period of time, relatively speaking, and could reverse in the future.

This scenario allows the Big Bang to occur immediately after the Big Crunch of a preceding universe. If this happens repeatedly, it creates a cyclic model, which is also known as an oscillatory universe. The universe could then consist of an infinite sequence of finite universes, with each finite universe ending with a Big Crunch that is also the Big Bang of the next universe. A problem with the cyclic universe is that it does not reconcile with the second law of thermodynamics, as entropy would build up from oscillation to oscillation and cause the eventual heat death of the universe[citation needed]. Current evidence also indicates the universe is not closed[citation needed]. This has caused cosmologists to abandon the oscillating universe model. A somewhat similar idea is embraced by the cyclic model, but this idea evades heat death because of an expansion of the branes that dilutes entropy accumulated in the previous cycle

The Big Bounce is a theorized scientific model related to the beginning of the known universe. It derives from the oscillatory universe or cyclic repetition interpretation of the Big Bang where the first cosmological event was the result of the collapse of a previous universe.

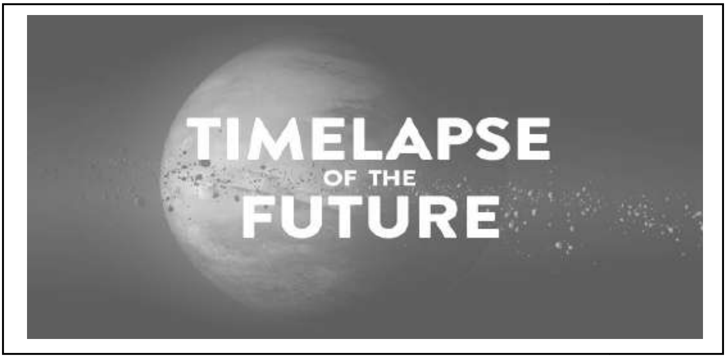
According to one version of the Big Bang theory of cosmology, in the beginning the universe was infinitely dense. Such a description seems to be at odds with other more widely accepted theories, especially quantum mechanics and its uncertainty principle.[citation needed] It is not surprising, therefore, that quantum mechanics has given rise to an alternative version of the Big Bang theory. Also, if the universe is closed, this theory would predict that once this universe collapses it will spawn another universe in an event similar to the Big Bang after a universal singularity is reached or a repulsive quantum force causes re-expansion.

In simple terms, this theory states that the universe will continuously repeat the cycle of a Big Bang, followed up with a Big Crunch. This theory posits that the universe currently exists in a false vacuum and that it could become a true vacuum at any moment. In order to best understand the false vacuum collapse theory, one must first understand the Higgs field which permeates the universe. Much like an electromagnetic field, it varies in strength based upon its potential. A true vacuum exists so long as the universe exists in its lowest energy state, in which case the false vacuum theory is irrelevant. However, if the vacuum is not in its lowest energy state (a false vacuum), it could tunnel into a lower-energy state. This is called vacuum decay. This has the potential to fundamentally alter our universe; in more audacious scenarios even the various physical constants could have different values, severely affecting the foundations of matter, energy, and spacetime. It is also possible that all structures will be destroyed instantaneously, without any forewarning

Each possibility described so far is based on a very simple form for the dark energy equation of state. However, as the name is meant to imply, very little is currently known about the physics of dark energy. If the theory of inflation is true, the universe went through an episode dominated by a different form of dark energy in the first moments of the Big Bang, but inflation ended, indicating an equation of state far more complex than those assumed so far for present-day dark energy. It is possible that the dark energy equation of state could change again, resulting in an event that would have consequences which are extremely difficult to predict or parametrize. As the nature of dark energy and dark matter remain enigmatic, even hypothetical, the possibilities surrounding their coming role in the universe are currently unknown. None of these theoretic endings for the universe are certain. Choosing among these rival scenarios is done by 'weighing' the universe, for example, measuring the relative contributions of matter, radiation, dark matter, and dark energy to the critical density. More concretely, competing scenarios are evaluated against data on galaxy clustering and distant supernovas, and on the anisotropies in the cosmic microwave background.

3.2.Human-religions predict The End of Universe

The end time (also called end times, end of time, end of days, last days, final days, doomsday, or eschaton) is a future described variously in the eschatologies of several world religions (both Abrahamic and non-Abrahamic), which teach that world events will reach a climax.



The Abrahamic religions maintain a linear cosmology, with end-time scenarios containing themes of transformation and redemption. In later Judaism, the term "end of days" makes reference to the Messianic Age and includes an in-gathering of the exiled Jewish diaspora, the coming of the Messiah, the resurrection of the righteous, and the world to come. Some forms of Christianity depict the end time as a period of tribulation that precedes the second coming of Christ, who will face the Antichrist along with his power structure and usher in the Kingdom of God.

In Islam, the Day of Judgement is preceded by the appearance of the al-Masih al-Dajjal, and followed by the descending of Isa (Jesus). Isa will triumph over the false messiah, or the Antichrist, which will lead to a sequence of events that will end with the sun rising from the west and the beginning of the Qiyamah (Judgment Day).

Dharmic religions tend to have more cyclical world-views, with end-time eschatologies characterized by decay, redemption, and rebirth. In Hinduism, the end time occurs when Kalki, the final incarnation of Vishnu, descends atop a white horse and brings an end to the current Kali Yuga. In Buddhism, the Buddha predicted his teachings would be forgotten after 5,000 years, followed by turmoil. A bodhisattva named Maitreya will appear and rediscover the teaching of dharma. The ultimate destruction of the world will then come through seven suns.

Since the development of the concept of deep time in the 18th century and the calculation of the estimated age of the earth, scientific discourse about end times has considered the ultimate fate of the universe. Theories have included the Big Rip, Big Crunch, Big Bounce, and Big Freeze (heat death).

In Hindu eschatology, time is cyclic and consists of kalpas. Each lasts 4.1–8.2 billion years, which is a period of one full day and night for Brahma, who will be alive for 311 trillion, 40 billion years. Within a kalpa there are periods of creation, preservation and decline. After this larger cycle, all of creation will contract to a singularity[citation needed] and then again will expand from that single point, as the ages continue in a religious fractal pattern.

Within the current kalpa, there are four epochs that encompass the cycle. They progress from a beginning of complete purity to a descent into total corruption. The last of the four ages is Kali Yuga, our current time, which will be characterized by impiety, violence and decay. The four pillars of dharma will be reduced to one, with truth being all that remains.

At this time of chaos, the final avatar, Kalki, endowed with eight superhuman faculties will appear on a white horse. Kalki will amass an army to "establish righteousness upon the earth" and leave "the minds of the people as pure as crystal."

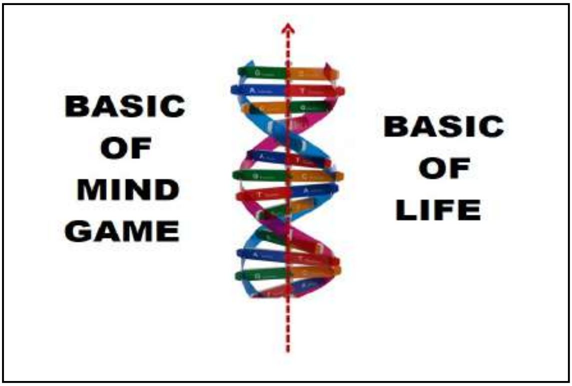
At the completion of Kali Yuga, the next Yuga Cycle will begin with a new Satya Yuga, in which all will once again be righteous with the reestablishment of dharma. This, in turn, will be followed by epochs of Treta Yuga, Dvapara Yuga and again another Kali Yuga. This cycle will then repeat till the larger cycle of existence under Brahma returns to the singularity,[citation needed] and a new universe is born

There is no classic account of beginning or end in Buddhism; Masao Abe attributes this to the absence of God.

History is embedded in the continuing process of samsara or the "beginningless and endless cycles of birth-death-rebirth". Buddhists believe there is an end to things[citation needed] but it is not final because they are bound to be born again. However, the writers of Mahayana Buddhist scriptures establish a specific end-time account in Buddhist tradition: this describes the return of Maitreya Buddha, who would bring about an end to the world. This constitutes one of the two major branches of Buddhist eschatology, with the other being the Sermon of the Seven Suns. End time in Buddhism could also involve a cultural eschatology covering "final things", which include the idea that Sakyamuni Buddha's dharma will also come to an end.

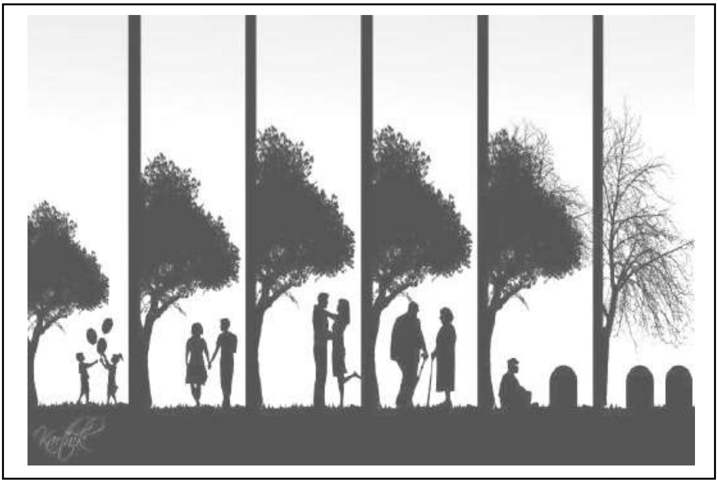
3.3.Computational Game has START/STOP/END

The basic concept of the evolution of life is a mind game, it can be seen from the concept of the spherical double helix of DNA. This DNA formation shows more of a cosmic dance game between biological pairs for a very long evolution of 3.8 billion years of life.



A Life will come to death finally. Death is the permanent, irreversible cessation of all biological functions that sustain a living organism. Brain death is sometimes used as a legal definition of death. The remains of a previously living organism normally begin to decompose shortly after death. Death is an inevitable, universal process that eventually occurs in all living organisms.

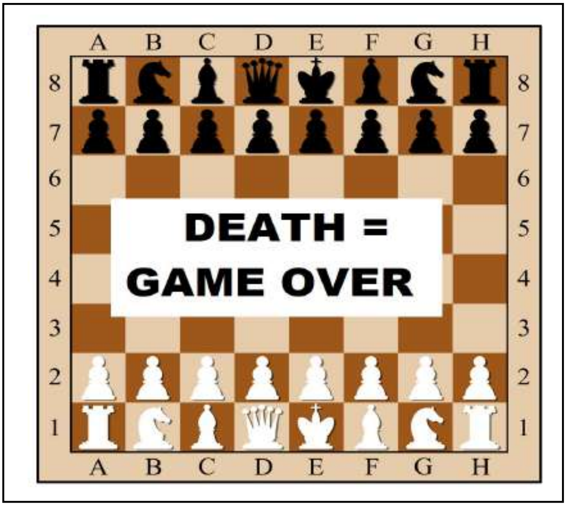
Death is generally applied to whole organisms; the similar process seen in individual components of a living organism, such as cells or tissues, is necrosis. Something that is not considered a living organism, such as a virus, can be physically destroyed but is not said to die.



As of the early 21st century, over 150,000 humans die each day. Many cultures and religions have the idea of an afterlife, and also may hold the idea of judgement of good and bad deeds in one's life (Heaven, Hell, Karma). The concept of death is a key to human understanding of the phenomenon.

Probably eternality scenario like this. Mohamad Musman thinks if someday somewhere in space time running, he would not expect born living in early barbaric era but he would rather born living in computer era like now.

One of the challenges in defining death is in distinguishing it from life. As a point in time, death would seem to refer to the moment at which life ends. Determining when death has occurred is difficult, as cessation of life functions is often not simultaneous across organ systems. Such determination, therefore, requires drawing precise conceptual boundaries between life and death. This is difficult, due to there being little consensus on how to define life.



It is possible to define life in terms of consciousness. When consciousness ceases, a living organism can be said to have died. One of the flaws in this approach is that there are many organisms that are alive but probably not conscious (for example, single-celled organisms). Another problem is in defining consciousness, which has many different definitions given by modern scientists, psychologists and philosophers. Additionally, many religious traditions, including Abrahamic and Dharmic traditions, hold that death does not (or may not) entail the end of consciousness. In certain cultures, death is more of a process than a single event. It implies a slow shift from one spiritual state to another.

Other definitions for death focus on the character of cessation of something. More specifically, death occurs when a living entity experiences irreversible cessation of all functioning. As it pertains to human life, death is an irreversible process where someone loses their existence as a person.

Historically, attempts to define the exact moment of a human's death have been subjective, or imprecise. Death was once defined as the cessation of heartbeat (cardiac arrest) and of breathing, but the development of CPR and prompt defibrillation have rendered that definition inadequate because breathing and heartbeat can sometimes be restarted. This type of death where circulatory and respiratory arrest happens is known as the circulatory definition of death (DCDD). Proponents of the DCDD believe that this definition is reasonable because a person with permanent loss of circulatory and respiratory function should be considered dead. Critics of this definition state that while cessation of these functions may be permanent, it does not mean the situation is irreversible, because if CPR was applied, the person could be revived. Thus, the arguments for and against the DCDD boil down to a matter of defining the actual words "permanent" and "irreversible," which further complicates the challenge of defining death. Furthermore, events which were causally linked to death in the past no longer kill in all circumstances; without a functioning heart or lungs, life can sometimes be sustained with a combination of life support devices, organ transplants and artificial pacemakers.

Today, where a definition of the moment of death is required, doctors and coroners usually turn to "brain death" or "biological death" to define a person as being dead; people are considered dead when the electrical activity in their brain ceases. It is presumed that an end of electrical activity indicates the end of consciousness. Suspension of consciousness must be permanent, and not transient, as occurs during certain sleep stages, and especially a coma. In the case of sleep, EEGs can easily tell the difference.

The category of "brain death" is seen as problematic by some scholars. For instance, Dr. Franklin Miller, senior faculty member at the Department of Bioethics, National Institutes of Health, notes: "By the late 1990s... the equation of brain death with death of the human being was increasingly challenged by scholars, based on evidence regarding the array of biological functioning displayed by patients correctly diagnosed as having this condition who were maintained on mechanical ventilation for substantial periods of time. These patients maintained the ability to sustain circulation and respiration, control temperature, excrete wastes, heal wounds, fight infections and, most dramatically, to gestate fetuses (in the case of pregnant "brain-dead" women)."

While "brain death" is viewed as problematic by some scholars, there are certainly proponents of it that believe this definition of death is the most reasonable for distinguishing life from death. The reasoning behind the support for this definition is that brain death has a set of criteria that is reliable and reproducible. Also, the brain is crucial in determining our identity or who we are as human beings. The distinction should be made that "brain death" cannot be equated with one who is in a vegetative state or coma, in that the former situation describes a state that is beyond recovery.

Those people maintaining that only the neo-cortex of the brain is necessary for consciousness sometimes argue that only electrical activity should be considered when defining death. Eventually it is possible that the criterion for death will be the permanent and irreversible loss of cognitive function, as evidenced by the death of the cerebral cortex. All hope of recovering human thought and personality is then gone given current and foreseeable medical technology. At present, in most places the more conservative definition of death – irreversible cessation of electrical activity in the whole brain, as opposed to just in the neo-cortex – has been adopted (for example the Uniform Determination Of Death Act in the United States). In 2005, the Terri Schiavo case brought the question of brain death and artificial sustenance to the front of American politics.

Even by whole-brain criteria, the determination of brain death can be complicated. EEGs can detect spurious electrical impulses, while certain drugs, hypoglycemia, hypoxia, or hypothermia can suppress or even stop brain activity on a temporary basis. Because of this, hospitals have protocols for determining brain death involving EEGs at widely separated intervals under defined conditions.

In the past, adoption of this whole-brain definition was a conclusion of the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research in 1980.They concluded that this approach to defining death sufficed in reaching a uniform definition nationwide. A multitude of reasons were presented to support this definition including: uniformity of standards in law for establishing death; consumption of a family's fiscal resources for artificial life support; and legal establishment for equating brain death with death in order to proceed with organ donation.

Aside from the issue of support of or dispute against brain death, there is another inherent problem in this categorical definition: the variability of its application in medical practice. In 1995, the American Academy of Neurology (AAN), established a set of criteria that became the medical standard for diagnosing neurologic death. At that time, three clinical features had to be satisfied in order to determine "irreversible cessation" of the total brain including: coma with clear etiology, cessation of breathing, and lack of brainstem reflexes. This set of criteria was then updated again most recently in 2010, but substantial discrepancies still remain across hospitals and medical specialties.

The problem of defining death is especially imperative as it pertains to the dead donor rule, which could be understood as one of the following interpretations of the rule: there must be an official declaration of death in a person before starting organ procurement or that organ procurement cannot result in death of the donor. A great deal of controversy has surrounded the definition of death and the dead donor rule. Advocates of the rule believe the rule is legitimate in protecting organ donors while also countering against any moral or legal objection to organ procurement. Critics, on the other hand, believe that the rule does not uphold the best interests of the donors and that the rule does not effectively promote organ donation

Game theory is the study of mathematical models of strategic interaction among rational decision-makers. It has applications in all fields of social science, as well as in logic, systems science and computer science.

Originally, it addressed zero-sum games, in which each participant's gains or losses are exactly balanced by those of the other participants. In the 21st century, game theory applies to a wide range of behavioral relations, and is now an umbrella term for the science of logical decision making in humans, animals, and computers.

Modern game theory began with the idea of mixed-strategy equilibria in two-person zero-sum games and its proof by John von Neumann. Von Neumann's original proof used the Brouwer fixed-point theorem on continuous mappings into compact convex sets, which became a standard method in game theory and mathematical economics. His paper was followed by the 1944 book Theory of Games and Economic Behavior, co-written with Oskar Morgenstern, which considered cooperative games of several players. The second edition of this book provided an axiomatic theory of expected utility, which allowed mathematical statisticians and economists to treat decision-making under uncertainty.

Game theory was developed extensively in the 1950s by many scholars. It was explicitly applied to evolution in the 1970s, although similar developments go back at least as far as the 1930s. Game theory has been widely recognized as an important tool in many fields. As of 2014, with the Nobel Memorial Prize in Economic Sciences going to game theorist Jean Tirole, eleven game theorists have won the economics Nobel Prize. John Maynard Smith was awarded the Crafoord Prize for his application of evolutionary game theory.

Discussions on the mathematics of games began long before the rise of modern, mathematical game theory. Cardano wrote on games of chance in Liber de ludo aleae (Book on Games of Chance), written around 1564 but published posthumously in 1663. In the 1650s, Pascal and Huygens developed the concept of expectation on reasoning about the structure of games of chance, and Huygens published his gambling calculus in De ratiociniis in ludo aleæ (On Reasoning in Games of Chance) in 1657.

In 1713, a letter attributed to Charles Waldegrave analyzed a game called "le Her". He was an active Jacobite and uncle to James Waldegrave, a British diplomat. In this letter, Waldegrave provides a minimax mixed strategy solution to a two-person version of the card game le Her, and the problem is now known as Waldegrave problem. In his 1838 Recherches sur les principes mathématiques de la théorie des richesses (Researches into the Mathematical Principles of the Theory of Wealth), Antoine Augustin Cournot considered a duopoly and presents a solution that is the Nash equilibrium of the game.

In 1913, Ernst Zermelo published Über eine Anwendung der Mengenlehre auf die Theorie des Schachspiels (On an Application of Set Theory to the Theory of the Game of Chess), which proved that the optimal chess strategy is strictly determined. This paved the way for more general theorems.

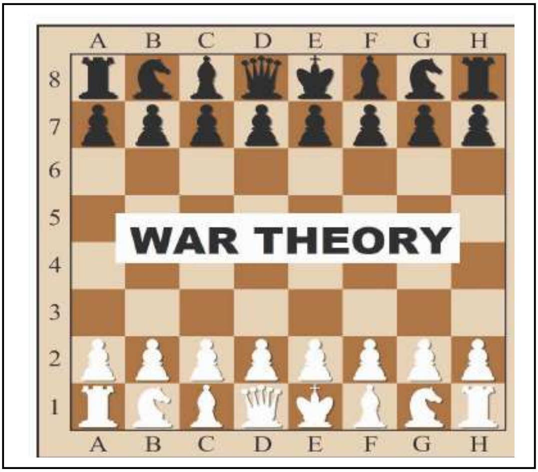
In 1938, the Danish mathematical economist Frederik Zeuthen proved that the mathematical model had a winning strategy by using Brouwer's fixed point theorem. In his 1938 book Applications aux Jeux de Hasard and earlier notes, Émile Borel proved a minimax theorem for two-person zero-sum matrix games only when the pay-off matrix was symmetric and provides a solution to a non-trivial infinite game (known in English as Blotto game). Borel conjectured the non-existence of mixed-strategy equilibria in finite two-person zero-sum games, a conjecture that was proved false by von Neumann.

Game theory did not really exist as a unique field until John von Neumann published the paper On the Theory of Games of Strategy in 1928. Von Neumann's original proof used Brouwer's fixed-point theorem on continuous mappings into compact convex sets, which became a standard method in game theory and mathematical economics. His paper was followed by his 1944 book Theory of Games and Economic Behavior co-authored with Oskar Morgenstern. The second edition of this book provided an axiomatic theory of utility, which reincarnated Daniel Bernoulli's old theory of utility (of money) as an independent discipline. Von Neumann's work in game theory culminated in this 1944 book. This foundational work contains the method for finding mutually consistent solutions for two-person zero-sum games. Subsequent work focused primarily on cooperative game theory, which analyzes optimal strategies for groups of individuals, presuming that they can enforce agreements between them about proper strategies.

In 1950, the first mathematical discussion of the prisoner's dilemma appeared, and an experiment was undertaken by notable mathematicians Merrill M. Flood and Melvin Dresher, as part of the RAND Corporation's investigations into game theory. RAND pursued the studies because of possible applications to global nuclear strategy. Around this same time, John Nash developed a criterion for mutual consistency of players' strategies known as the Nash equilibrium, applicable to a wider variety of games than the criterion proposed by von Neumann and Morgenstern. Nash proved that every finite n-player, non-zero-sum (not just two-player zero-sum) non-cooperative game has what is now known as a Nash equilibrium in mixed strategies.

Game theory experienced a flurry of activity in the 1950s, during which the concepts of the core, the extensive form game, fictitious play, repeated games, and the Shapley value were developed. The 1950s also saw the first applications of game theory to philosophy and political science.

The just war theory (Latin: jus belli justi) is a doctrine, also referred to as a tradition, of military ethics which is studied by military leaders, theologians, ethicists and policy makers. The purpose of the doctrine is to ensure that a war is morally justifiable through a series of criteria, all of which must be met for a war to be considered just. The criteria are split into two groups: "right to go to war" (jus ad bellum) and "right conduct in war" (jus in bello). The first group of criteria concerns the morality of going to war, and the second group of criteria concerns the moral conduct within war. Recently there have been calls for the inclusion of a third category of just war theory—jus post bellum—dealing with the morality of post-war settlement and reconstruction.



The just war theory postulates the belief that war, while it is terrible (but less so with the right conduct), is not always the worst option. Important responsibilities, undesirable outcomes, or preventable atrocities may justify war.

Opponents of the just war theory may either be inclined to a stricter pacifist standard (which proposes that there has never been nor can there ever be a justifiable basis for war) or they may be inclined toward a more permissive nationalist standard (which proposes that a war only needs to serve a nation's interests to be justifiable). In many cases, philosophers state that individuals do not need to be plagued by a guilty conscience if they are required to fight. A few philosophers ennoble the virtues of the soldier while they also declare their apprehensions for war itself. A few, such as

Rousseau, argue for insurrection against oppressive rule.

The historical aspect, or the "just war tradition", deals with the historical body of rules or agreements that have applied in various wars across the ages. The just war tradition also considers the writings of various philosophers and lawyers through history, and examines both their philosophical visions of war's ethical limits and whether their thoughts have contributed to the body of conventions that have evolved to guide war and warfare.

War is an intense armed conflict[a] between states, governments, societies, or paramilitary groups such as mercenaries, insurgents, and militias. It is generally characterized by extreme violence, aggression, destruction, and mortality, using regular or irregular military forces. Warfare refers to the common activities and characteristics of types of war, or of wars in general. Total war is warfare that is not restricted to purely legitimate military targets, and can result in massive civilian or other non-combatant suffering and casualties.

While some war studies scholars consider war a universal and ancestral aspect of human nature, others argue it is a result of specific socio-cultural, economic or ecological circumstances

The earliest evidence of prehistoric warfare is a Mesolithic cemetery in Jebel Sahaba, which has been determined to be approximately 14,000 years old. About forty-five percent of the skeletons there displayed signs of violent death. Since the rise of the state some 5,000 years ago, military activity has occurred over much of the globe. The advent of gunpowder and the acceleration of technological advances led to modern warfare. According to Conway W. Henderson, "One source claims that 14,500 wars have taken place between 3500 BC and the late 20th century, costing 3.5 billion lives, leaving only 300 years of peace (Beer 1981: 20)." An unfavorable review of this estimate mentions the following regarding one of the proponents of this estimate: "In addition, perhaps feeling that the war casualties figure was improbably high, he changed 'approximately 3,640,000,000 human beings have been killed by war or the diseases produced by war' to 'approximately 1,240,000,000 human beings. The lower figure is more plausible, but could still be on the high side considering that the 100 deadliest acts of mass violence between 480 BC and 2002 AD (wars and other man-made disasters with at least 300,000 and up to 66 million victims) claimed about 455 million human lives in total. Primitive warfare is estimated to have accounted for 15.1% of deaths and claimed 400 million victims. Added to the aforementioned figure of 1,240 million between 3500 BC and the late 20th century, this would mean a total of 1,640,000,000 people killed by war (including deaths from famine and disease caused by war) throughout the history and pre-history of mankind. For comparison, an estimated 1,680,000,000 people died from infectious diseases in the 20th century.

In War Before Civilization, Lawrence H. Keeley, a professor at the University of Illinois, says approximately 90–95% of known societies throughout history engaged in at least occasional warfare, and many fought constantly.

Keeley describes several styles of primitive combat such as small raids, large raids, and massacres. All of these forms of warfare were used by primitive societies, a finding supported by other researchers. Keeley explains that early war raids were not well organized, as the participants did not have any formal training. Scarcity of resources meant defensive works were not a cost-effective way to protect the society against enemy raids.

William Rubinstein wrote "Pre-literate societies, even those organised in a relatively advanced way, were renowned for their studied cruelty...'archaeology yields evidence of prehistoric massacres more severe than any recounted in ethnography .

Military strategy is a set of ideas implemented by military organizations to pursue desired strategic goals. Derived from the Greek word strategos, the term strategy, when it appeared in use during the

18th century, was seen in its narrow sense as the "art of the general", or "'the art of arrangement" of troops. Military strategy deals with the planning and conduct of campaigns, the movement and disposition of forces, and the deception of the enemy.

The father of Western modern strategic studies, Carl von Clausewitz (1780–1831), defined military strategy as "the employment of battles to gain the end of war." B. H. Liddell Hart's definition put less emphasis on battles, defining strategy as "the art of distributing and applying military means to fulfill the ends of policy". Hence, both gave the pre-eminence to political aims over military goals.

Sun Tzu (544-496 BC) is often considered as the father of Eastern military strategy and greatly influenced Chinese, Japanese, Korean and Vietnamese historical and modern war tactics. The Art of War by Sun Tzu grew in popularity and saw practical use in Western society as well. It continues to influence many competitive endeavors in Asia, Europe, and America including culture, politics, and business, as well as modern warfare. The Eastern military strategy differs from the Western by focusing more on asymmetric warfare and deception. Chanakya's Arthashastra has been important strategic and political compendium in Indian and asian history as well.

Strategy differs from tactics, in that strategy refers to the employment of all of a nation's military capabilities through high level and long term planning, development and procurement to guarantee security or victory. Tactics is the military science employed to secure objectives defined as part of the military strategy; especially the methods whereby men, equipment, aircraft, ships and weapons are employed and directed against an enemy. Strategy focus on how to win a war through a series of battles and campaigns, tactics focus on how to use the available means to win the battlefield.

Military strategy is the planning and execution of the contest between groups of armed adversaries. Strategy, which is a subdiscipline of warfare and of foreign policy, is a principal tool to secure national interests. It is larger in perspective than military tactics, which involves the disposition and maneuver of units on a particular sea or battlefield, but less broad than grand strategy otherwise called national strategy, which is the overarching strategy of the largest of organizations such as the nation state, confederation, or international alliance and involves using diplomatic, informational, military and economic resources. Military strategy involves using military resources such as people, equipment, and information against the opponent's resources to gain supremacy or reduce the opponent's will to fight, developed through the precepts of military science.

NATO's definition of strategy is "presenting the manner in which military power should be developed and applied to achieve national objectives or those of a group of nations. Strategy may be divided into 'Grand Strategy', geopolitical in scope and 'military strategy' that converts the geopolitical policy objectives into militarily achievable goals and campaigns. Field Marshal Viscount Alanbrooke, Chief of the Imperial General Staff and co-chairman of the Anglo-US Combined Chiefs of Staff Committee for most of the Second World War, described the art of military strategy as: "to derive from the [policy] aim a series of military objectives to be achieved: to assess these objectives as to the military requirements they create, and the pre-conditions which the achievement of each is likely to necessitate: to measure available and potential resources against the requirements and to chart from this process a coherent pattern of priorities and a rational course of action." Field-Marshal Montgomery summed it up thus "Strategy is the art of distributing and applying military means, such as armed forces and supplies, to fulfil the ends of policy. Tactics means the dispositions for, and control of, military forces and techniques in actual fighting. Put more shortly: strategy is the art of the conduct of war, tactics the art of fighting."

Military strategy in the 19th century was still viewed as one of a trivium of "arts" or "sciences" that govern the conduct of warfare; the others being tactics, the execution of plans and maneuvering of forces in battle, and logistics, the maintenance of an army. The view had prevailed since the Roman times, and the borderline between strategy and tactics at this time was blurred, and sometimes categorization of a decision is a matter of almost personal opinion. Carnot, during the French Revolutionary Wars thought it simply involved concentration of troops.

Strategy and tactics are closely related and exist on the same continuum; modern thinking places the operational level between them. All deal with distance, time and force but strategy is large scale, can endure through years, and is societal while tactics are small scale and involve the disposition of fewer elements enduring hours to weeks. Originally strategy was understood to govern the prelude to a battle while tactics controlled its execution. However, in the world wars of the 20th century, the distinction between maneuver and battle, strategy and tactics, expanded with the capacity of technology and transit. Tactics that were once the province of a company of cavalry would be applied to a panzer army.

It is often said that the art of strategies defines the goals to achieve in a military campaign, while tactics defines the methods to achieve these goals. Strategic goals could be "We want to conquer area X", or "We want to stop country Y's expansion in world trade in commodity Z"; while tactical decisions range from a general statement—e.g., "We're going to do this by a naval invasion of the North of country X", "We're going to blockade the ports of country Y", to a more specific "C Platoon will attack while D platoon provides fire cover".

In its purest form, strategy dealt solely with military issues. In earlier societies, a king or political leader was often the same person as the military leader. If not, the distance of communication between the political and the military leader was small. But as the need of a professional army grew, the bounds between the politicians and the military came to be recognized. In many cases, it was decided that there was a need for a separation.

As French statesman Georges Clemenceau said, "War is too important a business to be left to soldiers." This gave rise to the concept of the grand strategy which encompasses the management of the resources of an entire nation in the conduct of warfare. In the environment of the grand strategy, the military component is largely reduced to operational strategy—the planning and control of large military units such as corps and divisions. As the size and number of the armies grew and the technology to communicate and control improved, the difference between "military strategy" and "grand strategy" shrank. Fundamental to grand strategy is the diplomacy through which a nation might forge alliances or pressure another nation into compliance, thereby achieving victory without resorting to combat. Another element of grand strategy is the management of the post-war peace.

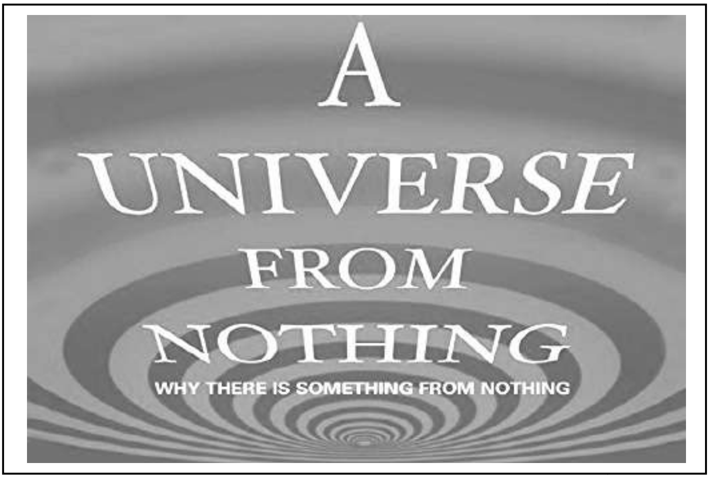
As Clausewitz stated, a successful military strategy may be a means to an end, but it is not an end in itself. There are numerous examples in history where victory on the battlefield has not translated into goals such as long term peace, security or tranquillity.

Life history theory is an analytical framework designed to study the diversity of life history strategies used by different organisms throughout the world, as well as the causes and results of the variation in their life cycles. It is a theory of biological evolution that seeks to explain aspects of organisms' anatomy and behavior by reference to the way that their life histories—including their reproductive development and behaviors, post-reproductive behaviors, and lifespan (length of time alive)—have been shaped by natural selection. A life history strategy is the "age- and stage-specific patterns" and timing of events that make up an organism's life, such as birth, weaning, maturation, death, etc. These events, notably juvenile development, age of sexual maturity, first reproduction, number of offspring and level of parental investment, senescence and death, depend on the physical and ecological environment of the organism.

The theory was developed in the 1950s and is used to answer questions about topics such as organism size, age of maturation, number of offspring, life span, and many others. In order to study these topics, life history strategies must be identified, and then models are constructed to study their effects. Finally, predictions about the importance and role of the strategies are made, and these predictions are used to understand how evolution affects the ordering and length of life history events in an organism's life, particularly the lifespan and period of reproduction. Life history theory draws on an evolutionary foundation, and studies the effects of natural selection on organisms, both throughout their lifetime and across generations. It also uses measures of evolutionary fitness to determine if organisms are able to maximize or optimize this fitness, by allocating resources to a range of different demands throughout the organism's life. It serves as a method to investigate further the "many layers of complexity of organisms and their worlds".

Organisms have evolved a great variety of life histories, from Pacific salmon, which produce thousands of eggs at one time and then die, to human beings, who produce a few offspring over the course of decades. The theory depends on principles of evolutionary biology and ecology and is widely used in other areas of science.

3.4.Probabilistic Unpredictible Big Rip



The ultimate fate of the universe is a topic in physical cosmology, whose theoretical restrictions allow possible scenarios for the evolution and ultimate fate of the universe to be described and evaluated. Based on available observational evidence, deciding the fate and evolution of the universe has become a valid cosmological question, being beyond the mostly untestable constraints of mythological or theological beliefs. Several possible futures have been predicted by different scientific hypotheses, including that the universe might have existed for a finite and infinite duration, or towards explaining the manner and circumstances of its beginning.

Observations made by Edwin Hubble during the 1920s–1950s found that galaxies appeared to be moving away from each other, leading to the currently accepted Big Bang theory. This suggests that the universe began – very small and very dense – about 13.82 billion years ago, and it has expanded and (on average) become less dense ever since. Confirmation of the Big Bang mostly depends on knowing the rate of expansion, average density of matter, and the physical properties of the mass–energy in the universe.

There is a strong consensus among cosmologists that the universe is considered "flat" (see Shape of the universe) and will continue to expand forever.
Factors that need to be considered in determining the universe's origin and ultimate fate include the average motions of galaxies, the shape and structure of the universe, and the amount of dark matter and dark energy that the universe contains.

In physical cosmology, the Big Rip is a hypothetical cosmological model concerning the ultimate fate of the universe, in which the matter of the universe, from stars and galaxies to atoms and subatomic particles, and even spacetime itself, is progressively torn apart by the expansion of the universe at a certain time in the future, until distances between particles will become infinite. According to the standard model of cosmology the scale factor of the universe is accelerating and, in the future era of cosmological constant dominance, will increase exponentially. However, this expansion is similar for every moment of time (hence the exponential law – the expansion of a local volume is the same number of times over the same time interval), and is characterized by an unchanging, small Hubble constant, effectively ignored by any bound material structures. By contrast, in the Big Rip scenario the Hubble constant increases to infinity in a finite time.

The possibility of sudden rip singularity occurs only for hypothetical matter (phantom energy) with implausible physical properties.

The truth of the hypothesis relies on the type of dark energy present in our universe. The type that could prove this hypothesis is a constantly increasing form of dark energy, known as phantom energy. If the dark energy in the universe increases without limit, it could overcome all forces that hold the universe together. The key value is the equation of state parameter w, the ratio between the dark energy pressure and its energy density. If $-1 < w < 0$, the expansion of the universe tends to accelerate, but the dark energy tends to dissipate over time, and the Big Rip does not happen. Phantom energy has $w < -1$, which means that its density increases as the universe expands.

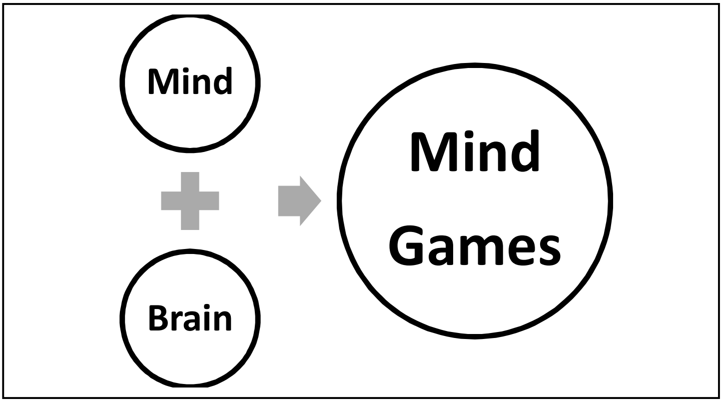
A universe dominated by phantom energy is an accelerating universe, expanding at an ever-increasing rate. However, this implies that the size of the observable universe and the particle horizon is continually shrinking – the distance at which objects are moving away at the speed of light from an observer becomes ever closer, and the distance over which interactions can propagate becomes ever shorter. When the size of the particle horizon becomes smaller than any particular structure, no interaction by any of the fundamental forces can occur between the most remote parts of the structure, and the structure is "ripped apart". The progression of time itself will stop. The model implies that after a finite time there will be a final singularity, called the "Big Rip", in which the observable universe eventually reaches zero size and all distances diverge to infinite values.

IV. Final Mind Games = Civilization

4.1. Civilization Final Mind Games

3.8 billion years of life are multi complex of mind games. If human civilization is singular in the universe, then civilization is a final mind game itself. Mind games are mathematical computational basics for generating the physical universe formats. A civilization is a complex society that is characterized by urban development, social stratification, a form of government, and symbolic systems of communication (such as writing).

Civilizations are intimately associated with and often further defined by other socio-politico-economic characteristics, such as centralization, the domestication of both humans and other organisms, specialization of labour, culturally-ingrained ideologies of progress and supremacism, monumental architecture, taxation, societal dependence upon farming and expansionism.



Historically, "a civilization" has often been understood as a larger and "more advanced" culture, in implied contrast to smaller, supposedly primitive cultures. In this broad sense, a civilization contrasts with non-centralized tribal societies, including the cultures of nomadic pastoralists, Neolithic societies or hunter-gatherers; however, sometimes it also contrasts with the cultures found within civilizations themselves. Civilizations are organized densely-populated settlements divided into hierarchical social classes with a ruling elite and subordinate urban and rural populations, which engage in intensive agriculture, mining, small-scale manufacture and trade. Civilization concentrates power, extending human control over the rest of nature, including over other human beings.

1000 exp (+1000)
Universe Algorithm
Was Created Before
The Big Bang

Civilization, as its etymology (see below) suggests, is a concept originally associated with towns and cities. The earliest emergence of civilizations is generally connected with the final stages of the Neolithic Revolution, culminating in the relatively rapid process of urban revolution and state-formation, a political development associated with the appearance of a governing elite.

The English word civilization comes from the 16th-century French civilisé ("civilized"), from Latin civilis ("civil"), related to civis ("citizen") and civitas ("city"). The fundamental treatise is Norbert Elias's The Civilizing Process (1939), which traces social mores from medieval courtly society to the Early Modern period. In The Philosophy of Civilization (1923), Albert Schweitzer outlines two opinions: one purely material and the other material and ethical. He said that the world crisis was from humanity losing the ethical idea of civilization, "the sum total of all progress made by man in every sphere of action and from every point of view in so far as the progress helps towards the spiritual perfecting of individuals as the progress of all progress".

Related words like "civility" developed in the mid-16th century. The abstract noun "civilization", meaning "civilized condition", came in the 1760s, again from French. The first known use in French is in 1757, by Victor de Riqueti, marquis de Mirabeau, and the first use in English is attributed to Adam Ferguson, who in his 1767 Essay on the History of Civil Society wrote, "Not only the individual advances from infancy to manhood but the species itself from rudeness to civilisation". The word was therefore opposed to barbarism or rudeness, in the active pursuit of progress characteristic of the Age of Enlightenment.

In the late 1700s and early 1800s, during the French Revolution, "civilization" was used in the singular, never in the plural, and meant the progress of humanity as a whole. This is still the case in French. The use of "civilizations" as a countable noun was in occasional use in the 19th century, but has become much more common in the later 20th century, sometimes just meaning culture (itself in origin an uncountable noun, made countable in the context of ethnography). Only in this generalized sense does it become possible to speak of a "medieval civilization", which in Elias's sense would have been an oxymoron.

Already in the 18th century, civilization was not always seen as an improvement. One historically important distinction between culture and civilization is from the writings of Rousseau, particularly his work about education, Emile. Here, civilization, being more rational and socially driven, is not fully in accord with human nature, and "human wholeness is achievable only through the recovery of or approximation to an original discursive or prerational natural unity" (see noble savage). From this, a new approach was developed, especially in Germany, first by Johann Gottfried Herder and later by philosophers such as Kierkegaard and Nietzsche. This sees cultures as natural organisms, not defined by "conscious, rational, deliberative acts", but a kind of pre-rational "folk spirit".
Civilization, in contrast, though more rational and more successful in material progress, is unnatural and leads to "vices of social life" such as guile, hypocrisy, envy and avarice. In World War II, Leo Strauss, having fled Germany, argued in New York that this opinion of civilization was behind Nazism and German militarism and nihilism.[

Social scientists such as V. Gordon Childe have named a number of traits that distinguish a civilization from other kinds of society. Civilizations have been distinguished by their means of subsistence, types of livelihood, settlement patterns, forms of government, social stratification, economic systems, literacy and other cultural traits. Andrew Nikiforuk argues that "civilizations relied on shackled human muscle. It took the energy of slaves to plant crops, clothe emperors, and build cities" and considers slavery to be a common feature of pre-modern civilizations.

All civilizations have depended on agriculture for subsistence, with the possible exception of some early civilizations in Peru which may have depended upon maritime resources. Grain farms can result in accumulated storage and a surplus of food, particularly when people use intensive agricultural techniques such as artificial fertilization, irrigation and crop rotation. It is possible but more difficult to accumulate horticultural production, and so civilizations based on horticultural gardening have been very rare. Grain surpluses have been especially important because grain can be stored for a long time. A surplus of food permits some people to do things besides producing food for a living: early civilizations included soldiers, artisans, priests and priestesses, and other people with specialized careers. A surplus of food results in a division of labour and a more diverse range of human activity, a defining trait of civilizations. However, in some places hunter-gatherers have had access to food surpluses, such as among some of the indigenous peoples of the Pacific Northwest and perhaps during the Mesolithic Natufian culture.

It is possible that food surpluses and relatively large scale social organization and division of labour predates plant and animal domestication.

Civilizations have distinctly different settlement patterns from other societies. The word "civilization" is sometimes simply defined as "'living in cities'". Non-farmers tend to gather in cities to work and to trade.

Compared with other societies, civilizations have a more complex political structure, namely the state. State societies are more stratified than other societies; there is a greater difference among the social classes. The ruling class, normally concentrated in the cities, has control over much of the surplus and exercises its will through the actions of a government or bureaucracy. Morton Fried, a conflict theorist and Elman Service, an integration theorist, have classified human cultures based on political systems and social inequality. This system of classification contains four categories;

- ✓ Hunter-gatherer bands, which are generally egalitarian.
- ✓ Horticultural/pastoral societies in which there are generally two inherited social classes; chief and commoner.
- ✓ Highly stratified structures, or chiefdoms, with several inherited social classes: king, noble, freemen, serf and slave.

- ✓ **Civilizations, with complex social hierarchies and organized, institutional governments.**

Economically, civilizations display more complex patterns of ownership and exchange than less organized societies. Living in one place allows people to accumulate more personal possessions than nomadic people. Some people also acquire landed property, or private ownership of the land. Because a percentage of people in civilizations do not grow their own food, they must trade their goods and services for food in a market system, or receive food through the levy of tribute, redistributive taxation, tariffs or tithes from the food producing segment of the population. Early human cultures functioned through a gift economy supplemented by limited barter systems. By the early Iron Age, contemporary civilizations developed money as a medium of exchange for increasingly complex transactions. In a village, the potter makes a pot for the brewer and the brewer compensates the potter by giving him a certain amount of beer. In a city, the potter may need a new roof, the roofer may need new shoes, the cobbler may need new horseshoes, the blacksmith may need a new coat and the tanner may need a new pot. These people may not be personally acquainted with one another and their needs may not occur all at the same time. A monetary system is a way of organizing these obligations to ensure that they are fulfilled. From the days of the earliest monetarized civilizations, monopolistic controls of

monetary systems have benefited the social and political elites.

The transition from simpler to more complex economies does not necessarily mean an improvement in the living standards of the populace. For example, although the Middle Ages is often portrayed as an era of decline from the Roman Empire, some studies have shown that the average stature of males in the Middle Ages (c. 500 to 1500 AD) was greater than it was for males during the preceding Roman Empire and the succeeding Early Modern Period (c. 1500 to 1800 AD). Also, the Plains Indians of North America in the 19th century were taller that their "civilized" American and European counterparts. The average stature of a population is a good measurement of the adequacy of its access to necessities, especially food.

Writing, developed first by people in Sumer, is considered a hallmark of civilization and "appears to accompany the rise of complex administrative bureaucracies or the conquest state".[35] Traders and bureaucrats relied on writing to keep accurate records. Like money, the writing was necessitated by the size of the population of a city and the complexity of its commerce among people who are not all personally acquainted with each other. However, writing is not always necessary for civilization, as shown by the Inca civilization of the Andes, which did not use writing at all but except for a complex recording system consisting of cords and nodes: the "Quipus", and still functioned as a civilized society.

ided by their division of labour and central government planning, civilizations have developed many other diverse cultural traits. These include organized religion, development in the arts, and countless new advances in science and technology.

Through history, successful civilizations have spread, taking over more and more territory, and assimilating more and more previously-uncivilized people. Nevertheless, some tribes or people remain uncivilized even to this day. These cultures are called by some "primitive", a term that is regarded by others as pejorative. "Primitive" implies in some way that a culture is "first" (Latin = primus), that it has not changed since the dawn of humanity, though this has been demonstrated not to be true. Specifically, as all of today's cultures are contemporaries, today's so-called primitive cultures are in no way antecedent to those we consider civilized. Anthropologists today use the term "non-literate" to describe these peoples.

Civilization has been spread by colonization, invasion, religious conversion, the extension of bureaucratic control and trade, and by introducing agriculture and writing to non-literate peoples. Some non-civilized people may willingly adapt to civilized behaviour. But civilization is also spread by the technical, material and social dominance that civilization engenders.

At first, the Neolithic was associated with shifting subsistence cultivation, where continuous farming led to the depletion of soil fertility resulting in the requirement to cultivate fields further and further removed from the settlement, eventually compelling the settlement itself to move. In major semi-arid river valleys, annual flooding renewed soil fertility every year, with the result that population densities could rise significantly. This encouraged a secondary products revolution in which people used domesticated animals not just for meat, but also for milk, wool, manure and pulling ploughs and carts – a development that spread through the Eurasian Oecumene.

Assessments of what level of civilization a polity has reached are based on comparisons of the relative importance of agricultural as opposed to trading or manufacturing capacities, the territorial extensions of its power, the complexity of its division of labour, and the carrying capacity of its urban centres. Secondary elements include a developed transportation system, writing, standardized measurement, currency, contractual and tort-based legal systems, art, architecture, mathematics, scientific understanding, metallurgy, political structures and organized religion.

Traditionally, polities that managed to achieve notable military, ideological and economic power defined themselves as "civilized" as opposed to other societies or human groupings outside their sphere of influence – calling the latter barbarians, savages, and primitives.

The earlier neolithic technology and lifestyle were established first in Western Asia (for example at Göbekli Tepe, from about 9,130 BC), and later in the Yellow River and Yangtze basins in China (for example the Pengtoushan culture from 7,500 BC), and later spread. Mesopotamia is the site of the earliest developments of the Neolithic Revolution from around 10,000 BC, with civilizations developing from 6,500 years ago. This area has been identified as having "inspired some of the most important developments in human history including the invention of the wheel, the planting of the first cereal crops and the development of the cursive script." Similar pre-civilized "neolithic revolutions" also began independently from 7,000 BC in northwestern South America (the Norte Chico civilization) and Mesoamerica.

The 8.2 Kiloyear Arid Event and the 5.9 Kiloyear Interpluvial saw the drying out of semiarid regions and a major spread of deserts. This climate change shifted the cost-benefit ratio of endemic violence between communities, which saw the abandonment of unwalled village communities and the appearance of walled cities, associated with the first civilizations.

This "urban revolution" marked the beginning of the accumulation of transferable surpluses, which helped economies and cities develop. It was associated with the state monopoly of violence, the appearance of a soldier class and endemic warfare, the rapid development of hierarchies, and the appearance of human sacrifice.

The civilized urban revolution in turn was dependent upon the development of sedentism, the domestication of grains and animals, the permanence of settlements and development of lifestyles that facilitated economies of scale and accumulation of surplus production by certain social sectors. The transition from complex cultures to civilizations, while still disputed, seems to be associated with the development of state structures, in which power was further monopolized by an elite ruling class] who practiced human sacrifice.

Towards the end of the Neolithic period, various elitist Chalcolithic civilizations began to rise in various "cradles" from around 3300 BC, expanding into large-scale empires in the course of the Bronze Age (Old Kingdom of Egypt, Akkadian Empire, Assyrian Empire, Old Assyrian Empire, Hittite Empire).

Political scientist Samuel Huntington has argued that the defining characteristic of the 21st century will be a clash of civilizations. According to Huntington, conflicts between civilizations will supplant the conflicts between nation-states and ideologies that characterized the 19th and 20th centuries. These views have been strongly challenged by others like Edward Said, Muhammed Asadi and Amartya Sen. Ronald Inglehart and Pippa Norris have argued that the "true clash of civilizations" between the Muslim world and the West is caused by the Muslim rejection of the West's more liberal sexual values, rather than a difference in political ideology, although they note that this lack of tolerance is likely to lead to an eventual rejection of (true) democracy. In Identity and Violence Sen questions if people should be divided along the lines of a supposed "civilization", defined by religion and culture only. He argues that this ignores the many others identities that make up people and leads to a focus on differences.

Cultural Historian Morris Berman suggests in Dark Ages America: the End of Empire that in the corporate consumerist United States, the very factors that once propelled it to greatness—extreme individualism, territorial and economic expansion, and the pursuit of material wealth—have pushed the United States across a critical threshold where collapse is inevitable. Politically associated with over-reach, and as a result of the environmental exhaustion and polarization of wealth between rich and poor, he concludes the current system is fast arriving at a situation where continuation of the existing system saddled with huge deficits and a hollowed-out economy is physically, socially, economically and politically impossible. Although developed in much more depth, Berman's thesis is similar in some ways to that of Urban Planner, Jane Jacobs who argues that the five pillars of United States culture are in serious decay: community and family; higher education; the effective practice of science; taxation and government; and the self-regulation of the learned professions. The corrosion of these pillars, Jacobs argues, is linked to societal ills such as environmental crisis, racism and the growing gulf between rich and poor.

Cultural critic and author Derrick Jensen argues that modern civilization is directed towards the domination of the environment and humanity itself in an intrinsically harmful, unsustainable, and self-destructive fashion. Defending his definition both linguistically and historically, he defines civilization as "a culture... that both leads to and emerges from the growth of cities", with "cities" defined as "people living more or less permanently in one place in densities high enough to require the routine importation of food and other necessities of life". This need for civilizations to import ever more resources, he argues, stems from their over-exploitation and diminution of their own local resources. Therefore, civilizations inherently adopt imperialist and expansionist policies and, to maintain these, highly militarized, hierarchically structured, and coercion-based cultures and lifestyles.

The Kardashev scale classifies civilizations based on their level of technological advancement, specifically measured by the amount of energy a civilization is able to harness. The scale is only hypothetical, but it puts energy consumption in a cosmic perspective. The Kardashev scale makes provisions for civilizations far more technologically advanced than any currently known to exist.

4.2. We are in same flight cockpit to see Universe?

Let's follow debates and argumnts about "flight cockpit of consciousness". Universal mind or universal consciousness is a metaphysical concept suggesting an underlying essence of all being and becoming in the universe.

It includes the being and becoming that occurred in the universe prior to the arising of the concept of "Mind", a term that more appropriately refers to the organic, human, aspect of universal consciousness. It addresses inorganic being and becoming and the interactions that occur in that process without specific reference to the physical and chemical laws that try to describe those interactions. Those interactions have occurred, do occur, and continue to occur. Universal consciousness is the source, ground, basis, that underlies those interactions and the awareness and knowledge they imply.

The concept of universal mind was presented by Anaxagoras, a Pre-Socratic philosopher who arrived in Athens some time after 480 BC. He taught that the growth of living things depends on the power of mind within the organisms that enables them to extract nourishment from surrounding substances. For this concept of mind, Anaxagoras was commended by Aristotle. Both Plato and Aristotle, however, objected that his notion of mind did not include a view that mind acts ethically, i.e. acts for the “best interests” of the universe.

The most original aspect of Anaxagoras's system was his doctrine of nous ("mind" or "reason"). A different Greek word, gnó̱si̱ (awareness), better reflects what is observed in the wider world of organic and inorganic being than just the human world. A worm, an amoeba, a bacterium, a raindrop, appears to act with "awareness" (gnó̱si̱) rather than "reason" (nous). Also, these actions would not commonly be referred to as being "reasonable" or "ethical".

In "The Huang Po Doctrine of Universal Mind", originated in around 857 CE, the idea of mind was disconnected from soul in this Buddhist school of thought.

The knowledge of Mind is the highest and hardest, just because it is the most 'concrete' of sciences. The significance of that 'absolute' commandment, Know thyself – whether we look at it in itself or under the historical circumstances of its first utterance – is not to promote mere self–knowledge in respect of the particular capacities, character, propensities, and foibles of the single self. The knowledge it commands means that of man's genuine reality – of what is essentially and ultimately true and real – of mind as the true and essential being."

Chu Ch'an says, "Universal mind, therefore, is something to which nothing can be attributed. Being absolute, it is beyond attributes. If for example, it were to be described as infinite, that would exclude from it whatever is finite, but the whole argument of the book is that universal mind is the only reality and that everything we apprehend through our senses, is nothing else but this mind. Even to think of it in terms of existence or non-existence is to misapprehend it entirely."

The term surfaced again in later philosophy, as in the writings of Hegel. - Hegel writes:

For centuries, modern science has been shrinking the gap between humans and the rest of the universe, from Isaac Newton showing that one set of laws applies equally to falling apples and orbiting moons to Carl Sagan intoning that "we are made of star stuff" — that the atoms of our bodies were literally forged in the nuclear furnaces of other stars.

Even in that context, Gregory Matloff's ideas are shocking. The veteran physicist at New York City College of Technology recently published a paper arguing that humans may be like the rest of the universe in substance and in spirit. A "proto-consciousness field" could extend through all of space, he argues. Stars may be thinking entities that deliberately control their paths. Put more bluntly, the entire cosmos may be self-aware.

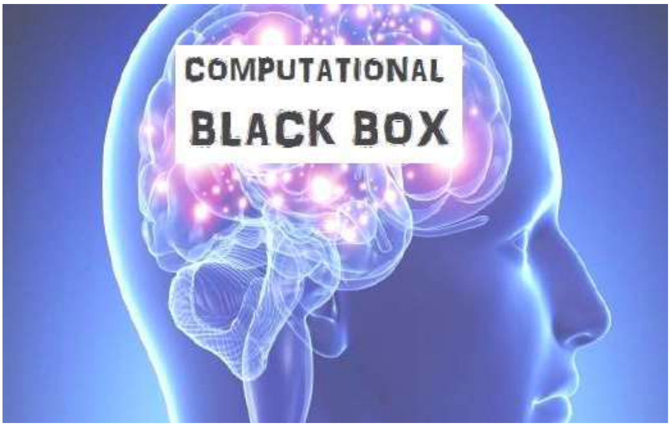
The notion of a conscious universe sounds more like the stuff of late night TV than academic journals. Called by its formal academic name, though, "panpsychism" turns out to have prominent supporters in a variety of fields. New York University philosopher and cognitive scientist David Chalmers is a proponent. So too, in different ways, are neuroscientist Christof Koch of the Allen Institute for Brain Science, and British physicist Sir Roger Penrose, renowned for his work on gravity and black holes. The bottom line, Matloff argues, is that panpsychism is too important to ignore. "It's all very speculative, but it's something we can check and either validate or falsify," he says.

Three decades ago, Penrose introduced a key element of panpsychism with his theory that consciousness is rooted in the statistical rules of quantum physics as they apply in the microscopic spaces between neurons in the brain.

In 2006, German physicist Bernard Haisch, known both for his studies of active stars and his openness to unorthodox science, took Penrose's idea a big step further. Haisch proposed that the quantum fields that permeate all of empty space (the so-called "quantum vacuum") produce and transmit consciousness, which then emerges in any sufficiently complex system with energy flowing through it. And not just a brain, but potentially any physical structure. Intrigued, Matloff wondered if there was a way to take these squishy arguments and put them to an observational test.

Related: What Einstein and Bill Gates Teach Us About Time Travel. One of the hallmarks of life is its ability to adjust its behavior in response to stimulus. Matloff began searching for astronomical objects that unexpectedly exhibit this behavior. Recently, he zeroed in on a little-studied anomaly in stellar motion known as Paranego's Discontinuity. On average, cooler stars orbit our galaxy more quickly than do hotter ones. Most astronomers attribute the effect to interactions between stars and gas clouds throughout the galaxy. Matloff considered a different explanation. He noted that the anomaly appears in stars that are cool enough to have molecules in their atmospheres, which greatly increases their chemical complexity.

Matloff noted further that some stars appear to emit jets that point in only one direction, an unbalanced process that could cause a star to alter its motion. He wondered: Could this actually be a willful process? Is there any way to tell?



If Paranego's Discontinuity is caused by specific conditions within the galaxy, it should vary from location to location. But if it is something intrinsic to the stars — as consciousness would be — it should be the same everywhere. Data from existing stellar catalogs seems to support the latter view, Matloff claims. Detailed results from the Gaia star-mapping space telescope, due in 2018, will provide a more stringent test.

Matloff is under no illusion that his colleagues will be convinced, but he remains upbeat: "Shouldn't we at least be checking? Maybe we can move panpsychism from philosophy to observational astrophysics."

4.3. Mind Consciousness Complexity

Following Boris Kotchoubey, Human Consciousness: Where Is It From and What Is It for, Institute of Medical Psychology and Behavioral Neurobiology, University of Tübingen, Tübingen, Germany. How's mind process to create algorithm of artificial intelligence. Consciousness is not a process in the brain but a kind of behavior that, of course, is controlled by the brain like any other behavior. Human consciousness emerges on the interface between three components of animal behavior: communication, play, and the use of tools. These three components interact on the basis of anticipatory behavioral control, which is common for all complex forms of animal life. All three do not exclusively distinguish our close relatives, i.e., primates, but are broadly presented among various species of mammals, birds, and even cephalopods; however, their particular combination in humans is unique. The interaction between communication and play yields symbolic games, most importantly language; the interaction between symbols and tools results in human praxis. Taken together, this gives rise to a mechanism that allows a creature, instead of performing controlling actions overtly, to play forward the corresponding behavioral options in a "second reality" of objectively (by means of tools) grounded symbolic systems. The theory possesses the following properties:

(1) It is anti-reductionist and anti-eliminativist, and yet, human consciousness is considered as a purely natural (biological) phenomenon.

(2) It avoids epiphenomenalism and indicates in which conditions human consciousness has evolutionary advantages, and in which it may even be disadvantageous.

(3) It allows to easily explain the most typical features of consciousness, such as objectivity, seriality and limited resources, the relationship between consciousness and explicit memory, the feeling of conscious agency, etc.

The buttock, however, in man, is different from all animals whatsoever. What goes by that name, in other creatures, is only the upper part of the thigh, and by no means similar.

Why do people think? Why do they calculate the thickness of walls of a boiler and do not let the chance determine it? Can a calculated boiler never explode? Of course, it can. We think about actions before we perform them. We make representations of them, but why? We expect and act according the expectancy;… Expectancy [is] a preparatory action. It outstretches its arms like a ball player, directs its hands to catch the ball. And the expectancy of a ball player is just that he prepares arms and hands and looks at the ball.

The two epigraphs already give partial, but essential, answers to the questions in the title. Where human consciousness is from? In a large extent, it is from the exceptionally extensive tool use, which would be impossible without the erectness supported by the exclusively strong gluteal muscles. What is its function? As indicated by Wittgenstein, it is a set of simulated anticipations.

Notwithstanding substantial differences, most contemporary theories of consciousness (e.g., Dennett, 1991; Damasio, 1999; Edelman and Tononi, 2000; Koch, 2004; Maia and Cleeremans, 2005) regard it as a kind of information processing. The present paper, in contrast, regards it as a kind of behavior. Behavior is a biological adjustment by means of movements and all kinds of movement-related physiological activity (see Keijzer, 2005, for general principles of the modern theoretical analysis of behavior). Of course, the brain plays a critical role in the control of behavior. Complex forms of behavior (including consciousness) necessarily require, and become possible due to, the complexity of the controlling brain. But there is no isomorphism between a controlling system and a controlled system.

The paper is not about neural correlates of consciousness (NCC). I just do not find the problem of NCC very interesting for several reasons, the simplest of which is: correlation is not causation. Further, it is not about the so called hard problem of consciousness (Chalmers, 1996). The starting point of the present considerations is actively behaving organisms able to various forms of learning (mainly, associative learning). I assume that thus behaving organisms already possess something that can be called "core consciousness" (Damasio, 1999).

By the term "human awareness", It means, in accord with most philosophers of mind (e.g., Searle, 2000; Beckermann, 2005), the ability to experience one's own "internal states" as intentional states (Brentano, 1982), i.e., internal states that are "about" some external objects. This term does not imply that all components of this "human awareness" are uniquely human or that this kind of consciousness cannot be found in any nonhuman animal. Several aspects of the presented model are already described in other published or submitted texts. In such cases only a very brief summary will be given here, and the reader will be referred to further papers. I understand that this way of presentation is highly inconvenient, but the space in open access journals is too valuable to afford the luxury of repetition.

The structure is as follows. First, I describe precursors and the three main behavioral components giving rise to human consciousness. Second, I describe a "central block" of human consciousness built on the interface between these three components . This part is the least original for the simple reason that description of human consciousness has been undertaken by numerous thinkers from St. Augustin to modern cognitive scientists, and a completely novel description is hardly possible. However, this section is necessary to show how the extant descriptions follow from the three components displayed in the first section, and to put it apart of alternative descriptions.

Third, we describe several most peculiar features of human consciousness to show how easily they are deduced from the presented model. Finally, we briefly regard the relationships between this model and some other, similar or remote theories of consciousness. Again, I ask for understanding that, for the above-mentioned space reasons the two latter points cannot be discussed in full in the present text; this discussion remains a topic of a separate analysis.

The organism/environment system is to be kept in a state of extreme energetic non equilibrium (Schrödinger, 1944). Life, therefore, is the continuous battle against the Second Law of Thermodynamics. All organisms' needs, from the need of a paramecium in food to the need of a composer to write a symphony, can be subsumed as a need in negentropy, in making order out of energetic death.

To maintain the highly improbable energetic state, organisms interact with their environment in a continuous process of anticipatory regulations. "Regulations" means that environmental disturbances are steadily compensated to make possible the "necessary condition for free an independent life": the stability of the internal milieu (Bernard, 1865). "Anticipatory" means that physiological regulations at the moment t are such as to compensate the disturbances at the moment t+1. This is particularly true for moving animals. The more mobile is an organism, the more distant is the organism's environment in terms of space, the more ahead of the present point it must be in terms of time.

However, the future cannot be known for sure. Anticipatory processes can therefore be regarded as hypotheses built by the organism about the future state of its environment. All biological adaptations are merely "assumptions to be tested by the selection" (Eibl-Eibesfeldt, 1997, p. 28). Behavioral adaptations, however, are even more hypothetical than, say, morphological adaptations, because they can be tested immediately after an action rather than later in the life. Behavior is principally anticipatory, i.e., based on prediction and correction of upcoming environmental disturbances (Grossberg, 1982; Rosen, 1985; Friston, 2012).

Several authors including, e.g., Bickhard (2005; Bickhard et al., 1989) and Jordan (1998, 2000; Jordan and Ghin, 2006) indicate that anticipatory interactions give rise to core consciousness. The emergence of primary elements of consciousness ("the hard problem") is beyond the topic of the present article. Of course, it is difficult to know and even more difficult to describe "what it is like" to have only core consciousness. Any description of a qualium (if there is such a thing), requires a term (e.g., "redness": Humphrey, 2006) which belongs to much higher levels of consciousness than the described phenomenon itself. In any case, our object here is not the emergence of such simple forms of consciousness but a very long way from them to that Cartesian cogito that we usually conceive of as our human awareness.

Anokhin (1974) demonstrated that all mechanisms of conditioning, including both Pavlovian (classical) and Skinnerian (operant) processes, can be considered as anticipatory phenomena. However, an important modification of the classical conditioning procedure is particularly interesting for the following development. In this modification, called preconditioning (Brodgen, 1939), subjects are presented a contingent pair of neutral stimuli (S1–S2; e.g., light and tone), none of them having biological significance. Not surprisingly, their combination does not yield any observable effect. Subsequently, S2 is paired with a typical unconditional stimulus (UCS, e.g., food), leading to a classical conditioned response (CR, salivation). After this, the first neutral stimulus (S1) is presented. Surprisingly, it also elicits a CR, although it has never been combined with the UCS.

The fact that stimuli having no reinforcing value can nevertheless affect behavior was a big challenge for behaviorist theory (see Seidel, 1959, for review). In fact, preconditioning implies two different achievements. First, a new dimension of time is opened. The association between S1 and S2 must be retained in memory until S2 is combined with UCS. Even more importantly, the animal's brain should have sufficient complexity to make use of contingency of nonsignificant events. Obviously the animal could not know that one of the stimuli would acquire a meaning in the subsequent conditioning. Therefore, it must be in possession of free resources to record some statistical regularities in the "environmental noise," whose meaning is momentarily zero. The only purpose of this enormous vast of resources is that some of these presently meaningless combinations may (perhaps) become meaningful in future.

Preconditioning is widely presented among different vertebrate species even in a very young age (e.g., Talk et al., 2002; Barr et al., 2003). Recent data indicate the possibility of sensory preconditioning in bees (Müller et al., 2000) and fruit flies (Brembs, 2002).

Up to this point, the animal lives in the world of its needs, among those relevant events that either satisfy these needs or counteract the satisfaction. This Lebenswelt is determined by the genetic design of the animal and continuously extended by learning: new features are revealed as soon as they are associated with genetically hard-wired biologically significant features. An organism is engaged only in those interactions it is designed for (Maturana, 1998). This simple law is first broken by preconditioning: the animal learns to pay attention to meaningless events. It overcomes immediate satisfaction of its needs and begins to "save information" with the hope that sometime it may become useful.

Preconditioning is association of two external elements ("stimuli") having no immediate consequence. Likewise, play is association of organism' own actions and external events, also having no immediate consequence. This definition leads us to distinguish between the immediate and the remote gains of an activity. On the one hand, play is "for fun" (otherwise it should not be called so), on the other hand, it can have a serious function. This vast of energy could not be so ubiquitous in nature if it is not compensated by some important gain. This contradiction between the immediate uselessness and the remote usefulness of play is probably the central point of all ethological, culturological and philosophical discussions to this issue.

An important feature of play is security. In play, skills can be exercised without a risk to fail. When a predator fails in hunting, it can die of hunger. (I mean wild animals, of course, not the pets cared for by old ladies.) A youngster which fails in hunting play will be alimented by its parents. Play, therefore, introduces something that can be called "second reality" (Vygotsky, 1978). In this reality the life is going on as if it is the "primary reality," but with the nice difference that whenever I don't like what happens, I simply stop the process and go out, or start it anew. This makes play suspiciously like consciousness. Coaches of athletes are aware of this similarity, thus they combine training without real competition (which is play, as competition is reality) with mental imagery (which is a typical phenomenon of human awareness).

Frequently, play appears to copy a serious activity (Burghardt, 2005). Play superficially imitates hunting, sex, aggression, but it is not what it seems. However, the imitative character is not obligatory. When parrots or monkeys just hang on branches and swing without any purpose, most human observers would find that they are playing, although such hanging and swinging does not appear to resemble any serious activity.

Although it is sometimes very difficult to decide whether a particular activity is a play, most people agree that many mammals and birds play (Burghardt, 2005). Playing octopuses have also been described (Kuba et al., 2006). Some groups likes predators, primates, sea mammals, and solipeds play distinctly more than others. Further, in all nonhuman species youngsters play considerably longer time (by a factor between 10 and 100) than adults. Already Lorenz (1971) noted that youngsters are more ready to learn nonsense.

Play is only relatively secure, however. A hunting play takes place in the same real world as the real hunt. Accordingly, although the dualism between play and reality is presented in philosophical thinking (Huizinga, 1950), it is not as strong and troubling as the dualism between mind and matter. Although the result of the playing activity is not of vital importance, the circumstances are real, and obstacles are material, thus the animal can be seriously injured. Remember how many soldiers in the armies die, not in a war, but in training.

Play is the first important consequence of the ability to learn without reinforcement. The second consequence is the use of tools. The role of tools in creating the world of objects, and of the very distinction between objective and subjective, is analyzed in Kotchoubey (2014). A tool is a neutral component of the environment used to operate with other components which, in turn, are related to the animal's survival. For example, a stick is neither eatable nor dangerous; but it can be used to reach fruits or to fight enemies. Manipulation with a tool cannot be successful from the very first trial. A stick is eventually manipulated "just for fun," and then, suddenly, it turns out to be useful. Thus no animals unable to play can use tools.

Remember that animals do not worry about the world "as such" (von Uexküll, 1970). They know (i.e., can efficiently deal with: Maturana, 1998) those elements and features of the world which are related to the animal's needs. This can be illustrated by the following scheme:

[Me] < = = > [something in the world as related to me]

(note that "me" is presented on both members of the scheme!)

Using a tool, an animal gets knowledge about a new kind of qualities: qualities which relate an element of its environment, not to the animal itself, but to other elements of the environment. For example, a stick used by apes for reaching bananas should possess the feature of hardness:

[Me] < —— > [a component of the world] < - - - - > [another component related to me]

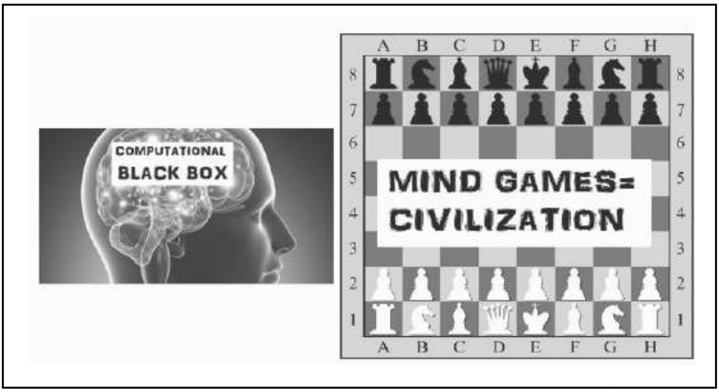
The dashed line < - - - - > indicates a newly acquired relation between two components of the outer world. From this moment I possess a bit of "objective" knowledge, in the sense that I know about some aspects of the world which are unrelated to my own being in this world. Bananas are eatable only as long as there is me who can eat them. Sticks, to the contrary, will remain hard independently of my existence. My knowledge of this hardness is, therefore, objective knowledge, and the corresponding aspect of my environment (i.e., the stick), is now an object. Also the solid line < —— > represents a new kind of relations: my ability to operate with tools and to choose means appropriate to my ends.

The objectivity of the obtained knowledge is, however, limited by the fact that the object in question remains related to me in two aspects: as my tool (something in my hand) and as an immediate mean to my goal (the banana). The object is "compressed" between me and me; it does not have an open end. Some animals, however, can make one step more combining two tools, as chimpanzees in famous experiments of Köhler (1926). This can be depicted as:

[Me] < —— > [object 1] < ~~~~~ > [object 2] < - - - - > [my goal]

The twisting line < ~~~~~ > between two objects stands for a relation from which I am completely factored out. For a long time after these experiments, it was believed that using higher-order tools is limited to most intelligent primates: humans and some apes. Now we know that using and making tools is widely presented among numerous animals including birds. Some parrots (like kea) particularly dexterous in tool usage are also particularly playful (Huber and Gajdon, 2006). Crows, ravens and finches use twigs, petioles, leaf stems and wire in both experimental and natural environment (Hunt et al., 2006; Watanabe and Huber, 2006). They flexibly adjust the length of their tools to the perceived distance from the food, prepare leaf stems for more convenience and use stones to bend wire or make hooks (Weir et al., 2002). They can use a short stick to reach a long stick to reach the food with the latter (Taylor et al., 2007). Chimpanzees, keas, and New Caledonian crows know something about the objective world.

Another important precursor that added to play and tool usage arises from communication. Communication can be defined as a behavior whose main effect is changing the behavior of another animal of the same or different species. A similar definition regards communication as the whole of biological effects selected for their influence on other animals of the same or different species. Any directed effects on another's behavior require transmission of signals between animals, and signals have a property to stand for something different from the signals themselves. According to the classical tripartition of Peirce, signals can be symbolic, iconic, and indicative (Buchler, 1955). Most animal communication signals belong to the category of indices. Indices are signs causally related to their reference; classical examples are medical symptoms indicating a particular disease. Fever and headache do not just "mean," or refer to, influenza, they are caused by the viral infect. Likewise, a danger scream is not arbitrary (like the word "danger") but physiologically related to the corresponding emotions of fear and anxiety. Also human exclamations such as "Ah!" and "Wow" are causally related to particular emotions and not products of agreement. They are parts of the organism's state and not just signs of this state (Kotchoubey, 2005a,b).



But a danger scream, though physically related to the state of fear, is not physically related to the cause of this state, e.g., the appearance of a predator. Different animal species use completely different signals to signalize the same thing. The signals can be flexibly adjusted to the kind of danger (Donaldson et al., 2007), as vervet monkeys, for example, produce different alarm signals for leopards, eagles, and snakes (Cheney and Seyfarth, 1990). Slowly, the progressive differentiation of signals can yield the ability to integrate them in new ways: a combination of two alarm signals may not be an alarm signal at all, but acquires a different meaning (Zuberbühler, 2002).

Although both animal communication and human speech are mainly vocal, most authors agree that there is probably no continuity between animal cries as indicative signs and human language constituted mainly from symbolic signs (Ackermann et al., 2014); rather, the decisive change was made within gestural communication (Arbib and Rizzolatti, 1996; Corballis, 2002; Arbib and Bota, 2003). Our closest ancestors in the animal world were not the best in vocal communication. Gestures, i.e., signs made by extremities independently of locomotion, exist, however, only in humans and apes and have not been found in any other animal including monkeys (Pollick and de Waal, 2007). Although animal cries also can be modified by context (Flack and de Waal, 2007), gestures are much more context-dependent (Cartmill and Byrne, 2007; Pika and Mitani, 2007), more flexible and thus their causal links to the underlying physiological states are much weaker as compared with vocalizations (Pollick and de Waal, 2007). Gestures thus paved the way for that separation between the signified and the signifying, which is so characteristic for true human language (e.g., Herrmann et al., 2006).

An interaction of communication signals with another factor mentioned above—namely, play—yields an emergent quality of playing games. Already Huizinga (1950) noted that any full-blown language is only possible on the basis of play as its precondition in contrast to animal communication that may not be related to play. Even relative independence of signs on their references can be used by an organism possessing the ability to play, which can now play with these signs, recombine them in deliberate combinations. The way is now open for conditional rules and systems of rules which might appear as strict as natural laws but, in contrast to those latter, they are not physically necessary. The notion of language as a symbolic game is frequently attributed to Wittgenstein (e.g., Hacker, 1988, 1990), who repeatedly compared language with chess (Wittgenstein, 2001).

Like the combination of symbols and play produces to the ability to play games, the mutual fertilization of symbols and tools brings about a new set of abilities to put remote goals and to relate them to actual sensorimotor interactions. The former complex gives rise to language, the most universal symbolic game all people play; and the latter gives rise to praxis (Frey, 2008). Language and praxis are two domains of abilities very specific for humans. Both require a famously unique feature of the human brain, i.e., its strong hemispheric asymmetry; both aphasias and apraxias result almost exclusively from lesions to the left hemisphere. The exact evolutionary process of this interaction is not completely clear. Gibson (1993) proposed that the use of tools may have caused the transition from mainly vocal to primarily gestural communication. On the other hand, Frey's (2008) review indicates that, more plausibly, tool use and gestures first developed as two independent systems and later interacted to produce human practical abilities.

Now we have all the necessary components together. The organism, which already at the beginning could learn through interactions with its environment, has acquired several additional facilities. Being able to manipulate a hierarchy of tools, it can now discriminate objective features of the world, that is, not only the features relating something to the organism but also features relating things to each other. The organism further possesses a developed system of signs and can distinguish (a) between a sign and an internal state, which the sign signifies; as well as (b) between the sign and an external object which the sign refers to. It can play with these signs, recombine them and construct complex systems of arbitrary rules for symbolic games.

Taken separately, communication, play and tool usage are broadly presented in nonhuman animals. None of these abilities can be said to coincide or strongly correlate with thinking or culture. None is limited to one particular group of our human ancestry, e.g., only to primates or mammals. None is related to a particular type of nervous system (Edelman et al., 2005); in fact, none can be said "a cortical function" because these behaviors are observed in birds (whose telencephalon is only a remote homolog to the mammalian cortex), and sometimes in insects and cephalopods, with their completely different neural morphology.

But the combination of communicative skills, play and tool use makes a qualitative jump. A being that possesses all these features can do the following: in a difficult situation, in which several behavioral alternatives are possible, it can experience something like "playing forward" (re. Play) each alternative, using symbols (re. Communication) referred to objective knowledge (re. Tools) about its environment. This process, i.e., internalized playing behavioral options, which takes into account objective features of the elements of environment and employs symbolic means, is nothing else but human conscious thinking .

The model of human consciousness we use here is a virtual reality (VR) metaphor (Baars, 1998). The main block of human consciousness is anticipatory behavior in a secure "virtual" space of symbolic relationships, in which this behavior does not have any overt consequences. Behavior is thus anticipated by playing it forward in the realm of objectively grounded symbols.

Unfortunately, VR metaphor has also been used in a meaning completely different from the present one. Revonsuo (1995) regarded all experience as VR created by our brains and having nothing in common with "something there." "The neural mechanisms bringing about any sort of sentience are buried inside our skulls and thus cannot reach out from there—the non-virtual world outside the skull is … black and imperceptible". He proposed a horrifying description of reality as "The Black Planet" in which we "cannot see anything, hear anything, feel anything." We can only construct a virtual world, but the real world outside will forever remain "silent and dark."

In a similar vein, Metzinger (2003) developed an elaborated model of consciousness largely based on the Revonsuo's (1995) VR metaphor:

"Neither the object component nor the physical body carrying the human brain has to exist, in principle, to phenomenally experience yourself as being related to certain external or virtual objects. … Any physical structure functionally isomorphic to the minimally sufficient neural correlate of the overall-reality model … will realize first-person phenomenology. A brain in a vat, of course, could—

if approximately stimulated—activate the conscious experience of being a self in attending to the color of the book in its hands, in currently understanding the semantic contents of the sentences being read, or in selecting a particular, phenomenally simulated action … the discovery of the correlates … could never help us decide is the question of how the brain in a vat could ever know that it is in this situation—or how you could know that you are now not this brain."

This solipsist VR metaphor should be strongly distinguished from the instrumentalist VR metaphor presented here. By the term "virtual" I mean "artificial" or "second-order," but not "unreal," "illusory," or "apparent." Play hunting is an artificial activity as compared with real hunting, but it is not an illusion of hunting. For example, in Pavlovian second-order conditioning an animal responds to a tone paired with a light after the light has been paired with food. The animal salivates to the tone although it has never been paired immediately with food, but only with the light. Pavlov might have called the light in such experiments a "virtual reinforcer" if the term "virtual" was current those days. But he would have been greatly surprised if a philosopher explained him that what he means is just an "appearance" of reinforcement, that there is no such thing as food in the animal's world, and that there is no world whatsoever around the animal.

Speaking that human awareness "models" or "simulates" reality, we should understand the meaning of the corresponding terms (Northoff, 2013; van Hemmen, 2014). Every physical or mathematical model building necessarily presumes some pre-knowledge about the process to-be modeled. To build a model of something we must already have an idea of what this thing is and what properties it has. Model building is always a way of testing the hypotheses formulated before we have started to model. Who states that our conscious awareness (or the brain as its organ) models the world, presumes that the world already exists independently of our awareness (Kotchoubey et al., 2016).

The obvious advantage of virtual behavior is the ability of secure learning. The price for learning can be an error and the price for an error can be a failure, an injury or even death. Thus the optimum would be an area in which we may commit errors without being punished for them but, nevertheless, learning from them. This virtual area is consciousness. In words of Karl Popper, instead of dying as a result of our errors, we can let our hypotheses die on our site (Popper, 1963).

On the other hand, the adaptive action is postponed (vast of time), and the resources are consumed for virtual activity having no immediate effect (vast of energy). Therefore, conscious

behavior is worth only in particularly complex situations in which its gains overweigh its losses:
(1) when there are several behavioral options whose consequences are unclear, or whose chances appear similar;
(2) when a risk of negative consequences of a wrong action is high, i.e., when the situation is dangerous but the danger is not immediate. Then, the disadvantage of the delay is overbalanced by the advantage of withholding an erroneous action.

Therefore, speaking about "human awareness," we do not mean that humans are in this state all the time. This would be a catastrophic vast of resources that the Mother Nature never could afford. Again, this does not mean that otherwise we behave "unconsciously." We just interact with our environment, we are engaged in our world. As Heidegger (1963) showed, this engagement is beyond the dichotomy of conscious vs. unconscious. We live in this engagement and experience it, and in this sense, we are conscious (Kadar and Effken, 1994), but we do not consciously think. We are just there (Heidegger, 1963; Clark, 1997).

Three arguments, which are frequently put forward to defend the solipsist variety of VR, can be regarded as objections against the present instrumentalist version: illusions, dreams, and paralysis. The illusion argument reads that consciousness cannot be deduced from interactions between organism and reality because in some mental states (e.g., illusions or delusions) we experience something different from reality. The argument is, first, inconsistent because who says that illusory perception is different from reality implies that he knows reality. Second, the argument confuses adaptive and maladaptive consciousness. Illusions in humans adapted to their environment occur only in very specific conditions on the background of millions of cases of veridical perception. Those whose mental life is prevailed by illusions, in contrast, are usually unable to survive without modern medicine and social support. The argument misses, therefore, the adaptive function of awareness.

This "ordinary state" of human existence can, of course, be compared with animal consciousness. We are thrown in our Lebenswelt like animals are thrown in theirs. However, our world is not theirs. The world in which we are engaged even without exerting conscious control is a social and instrumental world, i.e., it is already built up of those elements (tools, communication, symbolic games) which gave rise our conscious behavior. Many important differences between humans and apes result from the differences in their environment (Boesch, 2006). Most of our activity is automatic, like in animals, but these automatisms differ in both design and content (e.g., Bargh and Chartrand, 1999). Our existential reality is cultural, and so are our automatisms. Whitehead, who claimed that “civilization advances by extending the number of operations which we can perform without thinking”, illustrated this idea not with automatic catching or grasping, but with automatized operations of experienced mathematicians over algebraic symbols. This automatization is hardly attainable even for very clever apes.

The use of dreams in this context is equally misleading. The neural basis of dreams, the REM sleep, is completely different from the waking state in terms of physiological, humoral, neurochemical and behavioral components (Hobson and Pace-Schott, 2002; Pace-Schott and Hobson, 2002). Accordingly, dream experience has a number of formal (regardless of dream content) properties qualitatively different from those of our ordinary experience (e.g., Hobson, 1988; Stickgold et al., 2009). Lisiewski (2006) distinguishes between a “strong” and “weak” VR in the set-theoretical sense. “Strong” VR keeps constraints close to the constraints in the real world as it is experienced in simple forms of sentience. Examples are typical existing VR programs. In a “weak” VR, in contrast, all constraints are removed, e.g., one can fly, be simultaneously two persons, observe oneself from the side, etc. Dream consciousness, like science fiction stories, belongs to the latter category. That is why in dreams the muscle tone is nil, a finding predicted by Freud half a century before this fact was empirically proven (Freud, 1953). Freud's reason was that when reality constraints are removed, subjects must not have a possibility to actively behave. Therefore, dreams cannot be used as a model of conscious experience because the very essence of dream states is the blockade of the interaction between the organism and its environment.

The paralysis arguments indicates that humans extremely paralyzed for a long time (locked-in syndrome: LiS) and, therefore, lacking all overt behavior, nevertheless retain consciousness and can demonstrate very high intellectual functions (e.g., Kotchoubey et al., 2003; Birbaumer et al., 2008). However, all described cases of LiS (mainly a result of a brainstem stroke or of severe neurodegenerative diseases: for a review see Kotchoubey and Lotze, 2013) concern adult individuals, usually older than 30. All of them possess many years of experience of active behavior. From a philosophical viewpoint it might be intriguing whether consciousness would develop in a child with an inborn LiS, but from the ethical viewpoint we should be glad that no such case is known.

In most LiS patients, at least some movements (usually, vertical eye movements) still remain intact. Due to the progress of medicine and assistive technology, now many locked-in patients can use the remaining movements for communication and describe their experience in the acute period of the disease (e.g., Bauby, 1997; Pantke, 2017). These patients' reports show that the patients, albeit conscious and in possession of higher cognitive abilities, do not have “experiences as usual” as was previously believed. Rather, LiS is related to subtle disorders of conscious perception and attention that cannot be explained by the lesion of motor pathways but probably result from the dropout of motor feedback (Kübler and Kotchoubey, 2007; Kotchoubey and Lotze, 2013).

Using a Brain-Computer-Interface (BCI), cognitive abilities of LiS and other severely paralyzed patients can be checked independently of their motor impairment (e.g., Birbaumer et al., 2008). The analysis of the corresponding data shows that the ability to learn in patients, who possess minimal remaining movements (maybe only one), is only slightly, if at all, impaired in comparison with healthy controls. However, as soon as this last motor ability is lost, the learning ability is completely lost too (Kübler and Birbaumer, 2008). According to these authors, the minimum capacity to interact with the environment and to be reinforced for successive actions is a necessary prerequisite of intentional learning.

The paralysis argument is also important because it helps to distinguish between phylogenetic, ontogenetic, and actual genetic aspects of consciousness. My main claim that human consciousness emerges in human evolution at an interface between play, tool use, and communication does not imply that the same three components necessarily participate, and in the same constellation, in the individual development of conscious thinking in children. Even less is it to say that the same components necessarily participate in each actual case of conscious thinking. In the development of human behavior, many feedback loops, originally running between the organism and the environment or between the brain and bodily periphery, later on become shorter and remain within the simulating brain (e.g., Grusz, 2004).

To summarize, the objections are not convincing. The former two miss the adaptive function of consciousness and, therefore, presume epiphenomenalism. The paralysis argument requires an additional assumption of similarity between phylo- and ontogenesis and, besides this, ignores the fact that in the rare documented cases of complete LiS (i.e., when no behavior exists), no cognitive function could be found.

The most important implications of the model are recurrent processes at several levels. The best studied class of them is symbolic recursion. When we possess symbols causally free from the elements of the environment they stand for, and arbitrary rules which govern the use of these symbols, we can build symbols which stand for symbols, and rules governing other rules, and symbols standing for a system of rules governing symbols, etc., etc. At least primates (e.g., Flack and de Waal, 2007) and possibly dogs (Watanabe and Huber, 2006) are already capable of metacommunication, i.e., to signals indicating how the following signals should be interpreted. According to Chomsky (1968, 1981), symbolic recursion builds the basis for the infinite complexity of human language.

The second class encompasses instrumental recursive processes automatically emerging with the increasing order of tools. They can constitute highly complex loops, e.g., a machine A produces the machine B which produces the machine C which produces screws necessary to produce the machines A, B, and C.

Recursivity of human consciousness allows us to rebuff another objection that is traditionally put forward against all kinds of instrumentalism. According to the argument, we just need not see objects as tools. For example, we consciously perceive a meadow and trees upon it. Although all of this can be used (cows may pasture on the meadow; fruits may rife on the trees), this usefulness is not normally presented in our consciousness while we are looking at this view. Even in the instance of obviously useful objects (e.g., furniture) we usually perceive these objects without being aware of their instrumental value. I just see my sofa without being afforded to sit down on it. Even less am I aware of continuous action preparation in my consciousness. I see this, hear that, like one thing and dislike another one, but I do not plan any actions with them.

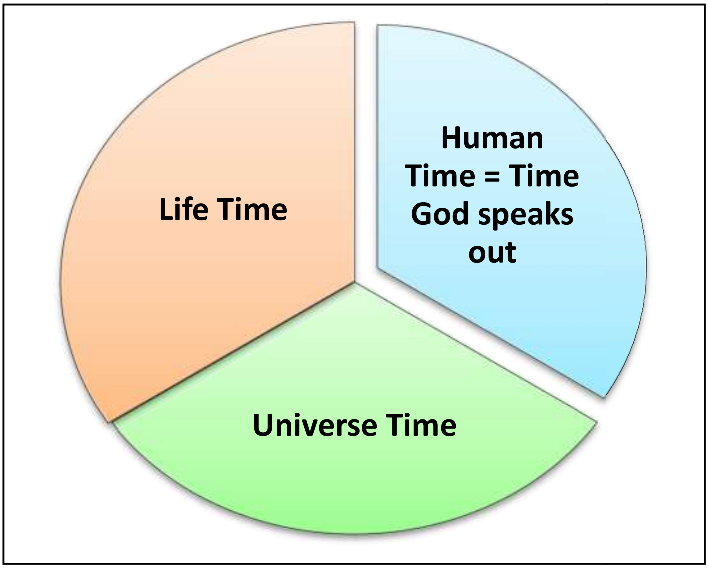
This "neutrality illusion" can be easily explained on the basis of the present model. While each tool use diminishes our personal relatedness to objects, closed loops can completely extinguish this relatedness. In the world of recursive relations between tools producing tools for making tools, I do not feel my personal involvement any longer, but remain an external observer, a passive viewer of the complex systemic relationships between the multiple components of my world, rather than a component of this same system.

Perhaps the most interesting kind of recursive processes, in addition to symbolic and instrumental recursion, is the temporal recursion. It will be briefly depicted below in section Memory.

A theoretical model of consciousness can be evaluated by the easiness with which the known properties can be deduced from it (Seth et al., 2005). These authors proposed a list of "sixteen widely recognized properties of consciousness" including philosophical (e.g., self-attribution), psychological (e.g., facilitated learning), and physiological (e.g., thalamocortical loops) criteria. Some of these criteria correspond to our everyday experience ("consciousness is useful for voluntary decision making"), whereas others ("sensory binding") are only valid within the framework of a particular hypothesis which is neither empirically supported (Fotheringhame and Young, 1998; Riesenhuber and Poggio, 1999; Vanderwolf, 2000) nor logically consistent (Bennett and Hacker, 2003; van Duijn and Bem, 2005). The list does not include intentionality (Brentano, 1982), nor does it warrant that the 16 criteria are mutually independent (e.g., "involvement of the thalamocortical core" and "widespread brain effects") and non-contradictory (e.g., "fleetingness" and "stability").

As our present topic is human consciousness, this list of properties to test the model should not, on the one hand, include unspecific properties of any kind of conscious experience. On the other hand, we should not consider properties related to specific historical and cultural forms of human consciousness (e.g., satori), and by no way should we regard those questionable "properties" deduced from particular views on human nature, e.g., such property of consciousness as "computational complexity" (as if the WWW were computationally simple).

On the basis of these considerations, and taking into account space limits, I do not claim to check an exhaustive list of criterial properties of human consciousness, but rather, to illustrate the consequences of the hypothesis using a few representative examples: seriality and limited capacity; objectivity; the intimate relation between consciousness and memory; and the sense of conscious agency.



The serial character of human conscious experience is a highly salient and, from the point of view of many neurophysiologists, an almost mysterious feature. While the brain (which is supposed to be the seat of mind) works as a parallel distributed network with virtually unlimited resources, conscious events are consecutive, happen one at a moment, and their momentary capacity is strongly limited. Theories regarding consciousness as a particular case of brain information processing must, therefore, suggest a specific mechanism creating serial processing from parallel. This compromises the aesthetics of the corresponding theories, because in addition to the multiple brain mechanisms generating conscious contents one more mechanism is postulated to make these contents run in a row.

The difficulties disappear, however, we assume that consciousness has been emerged from behavior and is itself a covert behavior. As already said, human consciousness can be afforded only in specific, particularly complex situations. But any kind of complex behavior is a series of organism-environment interactions. A cat do not hunt and wash, or eat and play, at the same time. Likewise, we cannot simultaneously turn left and turn right, notwithstanding all parallel distributed processing in our brain.

A similar idea was suggested by Merker (2007) who related the seriality of conscious behavior to the existence of a "motor bottleneck" in the bridge (pons cerebri) in the upper part of brain stem. However distributed are processes in the cortex, in order to reach muscles the cortical activity must pass through the site where all impulses from the forebrain to the motor periphery converge. Locked-in syndrome discussed in the section Objections above is most frequently a result of a stroke in this area. From this point of view, consciousness is serial because it is restricted by the "common final path" to the effectors, and its limited capacity is a function of the limited capacity of motor activity.

An example of locomotion, which is largely unconscious, illustrates the limits of parallel behavior. With automatization of a motor skill organisms acquire the ability to perform some motor acts simultaneously. This process plays a particular role in actively communicating animals such as primates. After extensive experience the muscles of face and tongue become independent of peripheral coordinations, and we can walk and talk at the same time. But as soon as the situation gets more complex, this ability to perform two behavioral acts in parallel is lost. It is difficult and even dangerous to actively communicate while descending an unfamiliar stair in complete darkness. Complex behaviors are serial by nature. In those exceptional cases in which they can run in parallel, the states of consciousness can be parallel, too: whales sleep with one half of the body.

The serial character of human consciousness is closely related to another specific feature, the intolerance of contradiction. Parallel distributed processing in brain networks has nothing against contradiction; different neuronal assemblies can simultaneously process different aspects of information, perhaps incompatible with each other. Both Freudian and cognitive unconscious (Shevrin and Dickman, 1980; Kihlstrom, 1987) are highly tolerant against contradiction. This fact strongly contradicts (sorry for word play) to the negative affect we get as soon as we notice a contradiction between two contents of our consciousness. Again, the paradox disappears when we realize that consciousness is not a processing but a behavior.

Mostly, ambiguous behavior is either physically impossible (e.g., simultaneous moving in two directions), or maladaptive (e.g., making one step forth and one step back). Why should consciousness be different?

This term is used in two interrelated meanings. First, it means that we live in the world which appears to contain distinct and relatively stable entities called objects. Second, "objectivity" means a kind of detachment, i.e., freedom from values, needs, passions, and particular interests. To my knowledge these features are either taken for granted (i.e., the world just consists of objects), or attributed solely to the development of language (e.g., Maturana and Varela, 1990; Dennett, 1991; Damasio, 1999). The former view is not tenable: our being in the world is not a cold and impersonal observation. The latter view is partially true. Operations with signs standing for something different increase the distance between us and the world. Symbolic systems are powerful tools we use to deconstruct the complex world into separate things.

However, in order to use words as tools, we first must use tools. Language can support but not create the objective world. Only tools can do this because they are material components of the same world. Tools put themselves between us and our needs projected into the world (see Tools above). They expand the space relating the organism to its immediate Lebenswelt so much that they transform it into the space separating the organism from its environment. They enforce me to deal with relationships between different elements of the world, and between different features of these elements, rather than to be ever egocentrically busy by the relationships between the world and myself. They decentralize world. More than one million years ago, the early Homo already employed higher-order tools (Ambrose, 2001; Carbonell et al., 2008). Long before Copernicus stopped the sun rotating around the Earth, tool usage stopped the world to rotate around each animal's needs. In the extent the needs retire into the background, so the related emotions. We can now be engaged into the world of entities which do not immediately concern us. We can, within some narrow limits, remain cool and “objective” (Kotchoubey, 2014).

Symbolic games add a new quality to this objectivity. The two sets of recursive loops (the symbolic and the instrumental) mutually interact, further enhancing detachment and disengagement. When the recursivity of tools added with the recursivity of signs conditionally referred to the tools, the distance between the organism and the world becomes a gap. First the relationship “me-world” was replaced, or at least complemented, with the relationships among objects. Then even these latter are substituted by the relationships between arbitrary symbols standing for objects and their relations.

The higher is the order of tool use, the stronger am I bracketed out of the chain of events. The transformation of the fluent energy of the world into the static order of stable objects finally attains the degree at which I am myself (almost) similar to other things. The living human organism, which is primarily a node of struggling, suffering, enjoying, wanting energies, becomes (almost) just another object of cold cognition among many objects. In the course of this decentration an individual can even get a strange idea that his/her own behavior is caused by external objects, like a behavior of a billiard ball is mechanically caused by other balls hitting it!

In our culture, the objectivity of the world is further strengthened and enhanced by the stance of natural science (Galilei, 1982). From this point of view only quantitative relations among elements of the world are "real," that is, they belong to the world itself. In contrast, qualities, i.e., the effects of these relations on my own organism, are regarded not as "physical facts" anymore, but as "illusions" of my "mind" (Dewey, cf. Hickman, 1998). Thus color, warmth, loudness, all these proofs of my engagement in the world are just "mental events" indirectly referred to some other (real, physical) characteristics such as wavelength, molecular energy, or amplitudes of oscillations. Interpretation of the relationships between us and various aspects of our environment in terms of the relationships among these aspects became a criterion of scientific truth.

Thus the physiological opposition between the milieu intériere and milieu extériere (Bernard, 1865) becomes the philosophical opposition between the Subject and the Object. Both are products of using tools, separating the organism from the world.

The relationship between embodiment, memory, and consciousness are discussed in a parallel paper (Kotchoubey, in press) and can only briefly be concerned here. Human consciousness defined as a virtual space for covert anticipatory actions implies an ability to deliberately delay reinforcement ("building a bridge over the gap of time"), thus introducing a strong time dimension. It has even been proposed that the freedom to operate in time, i.e., to activate in one's behavior temporary remote events, conditions, and one's own states, is the specificum humanum, the main feature distinguishing humans from all other creatures (Bischof-Köhler, 2000; Suddendorf, 2013). The close correspondence between kinds of memory and kinds of consciousness was first demonstrated by Tulving (1985a,b). Also, he showed on the basis of neuropsychological observations that memory is a bi-directional function, i.e., it relates the organism not only with its past but also with its future (Tulving, 1985b, 1987).

In accordance with this idea, the present model of consciousness is hardly compatible with the classical view that memory is about the past. This view is based on the computer metaphor implying strong separation between storing and processing, which does not exist in biological organisms. From an evolutionary viewpoint, memory was selected not to store the past but to use the past in order to optimize the present behavior and to organize future adaptation. "[T]here can be no selective advantage to mentally reconstruct the past unless it matters for the present or future" (Suddendorf and Busby, 2005, p. 111).This is equally true for short-time memory (STM) as an obvious derivate from working memory, which is immediate future planning (e.g., Atkinson et al., 1974). Atkinson and Shiffrin (1971) even identified the actual content of consciousness with the content of STM.

As soon as memory is not regarded anymore as a function of saving information, but rather, as that of behavioral adaptation taking into account the organism's past, many phenomena usually viewed as "errors of memory" became normal. When we are prompted to remember something, we build hypotheses, check them up and adjust them according to the actual situation to other components of knowledge (Bartlett, 1967) as well as to social conditions (Loftus, 1997; Gabbert et al., 2003). In other words, our behavior toward the past does not differ from that toward the present or future. Most so-called errors of memory are not malfunctions, they indicate the flexibility and adaptability of our behavior in the time domain (Erdelyi, 2006). Remembering is neither a faithful recapitulation of past events nor a construction of a reality-independent mental world, but interaction and adaptation (Suddendorf and Busby, 2003).

In the VR of human consciousness an overt action with its real consequences is delayed until the virtual action is virtually rewarded or punished. Therefore, the time dimension, which originally was a flow of events, is now split into several axes. First, the flow of behavioral events is held, as long as no events happen. Second, the sequence of events in consciousness creates a new flow of symbolic events: a second axis, along which we can free move in both directions (Bischof-Köhler, 2000; Suddendorf, 2013). The freedom of moving backwards is of vital importance; otherwise, erroneous actions with their negative consequences would be as uncorrectable as they are in real life. Third, although overt behavior is delayed, other processes (physiological activity at the cellular, tissue and organ levels, as well as automatic actions) go on.

The split time makes human consciousness particularly interesting and dramatic. The combination of the resting external time with the free travel in the virtual time provides us with the ability to quickly actualize (in the sense: make actual, efficient in our behavior) any remote or possible consequence. If we only once ask, "when I do this, what after?" nothing (in principle) can prevent us from asking the same question infinitely many times (e.g., "when after X comes Y, what comes after Y? And what is after the event which will happen after Y?"; etc.). This recursive process renders us to know that the day after tomorrow will be followed by the day after the day after tomorrow, and so on up to the day of our death. But, then, what happens after my death? I don't want to say that all humans really ask these endless "what after?" questions. I want to stress, however, that the ability to realize one's whole life and death and to ask what will follow it is not a product of a particular cultural development, but belongs to the most universal properties of human consciousness and immediately results from the basic structure of anticipatory behavior in the virtual space of symbolic games.

The question, why complex human (and animal) behavior is necessarily free, has been discussed in many details elsewhere (Kotchoubey, 2010, 2012). In this text, I shall only concern one particular aspect of this general problem, namely the strong feeling of agency, of personal control of one's actions. This issue clearly demonstrates the advantage of the present model of human consciousness over the prevailing cognitive models. These latter assume that the brain first has to make representations of outer objects, and then, this cognitive activity is complemented by actions to deal with these objects. Despite a century of serious critique (Dewey, 1896; Järvilehto, 2001b) this notion is still alive and leads us to ask the question of how the brain can know that my movements belong to me. As always, the answer is postulating an additional "module" of attribution of actions to the agent (de Vignemont and Fourneret, 2004). Thus a cat's brain first makes a decision that she will jump for a mouse, and then, she needs an additional decision making that she (rather than another cat, or a fox, or a raven) will jump for the mouse.

Such problems do not emerge altogether when we remember that the object of adaptive behavioral control are not our motor actions (the output) but a particular state of affairs (the input) (Marken, 1988; Jordan, 1999). Humans think in teleological terms (Csibra and Gergely, 2007) not because such thinking can be useful but because actions cannot be described in terms other than their outcomes (Hommel et al., 2001). Actions are voluntary if the input patterns they generate can be covertly tested within the virtual space of consciousness.

This definition has important corollaries. It does not require that we are aware of any details of the actions we nevertheless perceive as conscious. The logical impossibility of such awareness was demonstrated by Levy (2005). Equally impossible (and in a blatant contradiction with our intuitive feeling) are the demands that voluntary actions should be preceded by feelings like "wish" or "urge," or must imply a zero effect of the situation on behavior (e.g., Wegner, 2002). No behavior can be carried out without taking some aspects of the environment into account.

The basis of agency is the simple fact that predators, as a rule, do not attack their own body. This is the difference between "the inside" and "the outside" quite similar to the distinction between the own and alien albumins in the immune system. Of course, this fundamental representation of behavioral actions as "mine" need not be conscious, let alone conscious in the sense of the present article. However, as soon as we admit that consciousness develops from behavior, we understand that this simple me/non-me distinction is a precursor of human agency.

What makes this agency the fact of our conscious awareness is the choice. Most lay people simply identify freedom with choice (e.g., Monroe and Malle, 2010; Vonasch and Baumeister, 2013; Beran, 2015). Choice is the result of the fact that virtually performed actions can differ from the actions overtly performed. If there is no this difference, i.e., if we always perform the same action that we have thought about, the whole enterprise of "consciousness as VR" would be meaningless. But when this difference exists, it proves that in the same situation at least two different actions were possible, and therefore, we had freedom of choice .

In hindsight, we regard an action as voluntary if we did, or could, estimate possible consequences of several alternatives and selected one whose virtual results were the best1.

A necessary but not sufficient mechanism of this choice is inhibition of overt behavior. Therefore, the view that associates volition with the ability to exert inhibitory control of otherwise involuntary actions (veto: Libet, 1985) deserves attention. Human conscious activity strongly correlates with activation of those brain structures whose main function is inhibition. These structures are specifically active during particularly complex forms of human behavior. However, inhibitory control is a precondition of volition but not volition itself. If I have to repair my car, I must stop it first; but stopping is not repair. The decisive point is not veto but choice.

A good theory does not only shed light at its object, but also at the other views on the same object. As a famous example, the relativity theory not just explains the mechanisms of the Universe; it is also successful in the explanation of why other respectable theories (e.g., Newtonian mechanics) gave a different explanation of the same mechanisms: because they regarded a very limited range of possible velocities. Likewise, from the point of view presented here the origins of several alternative theories of consciousness can be apprehended. Of course, this highly interesting task cannot be pursued in full in this paper; we cannot discuss all existent theories of consciousness in their relationship with the current model. Rather, I shall restrict the review to the approaches apparently similar to the present one.

The proposed theory is most similar to embodiment theories of consciousness, simply because it is one of them. Embodiment theories are characterized by "4Es": human experience is embodied (i.e., brain activity can realize mental processes only being involved in closed loops with the peripheral nervous system and the whole bodily periphery including inner organs and the motor apparatus), embedded (i.e., the brain-body system is further involved in closed loops with the environment), enacted (i.e., in the interaction with the environment, brain and mind not just process information but make the organism to play the active role pursuing its goals notwithstanding environmental disturbances), and extended (i.e., it involves external devices as if they were parts of the same brain-body system) (e.g., Tschacher and Bergomi, 2011).

Beyond the general agreement at these four points, different embodiment theories of mind and consciousness build a very broad spectrum varying in their account on the exact role and mechanisms of realization of each point, as well as interactions between them. The hard discussions running in the last decades within the embodiment camp would, however, lead us far beyond our present topic; they are addressed, e.g., in the publications of Menary (2010), Bickhard (2016), Stapleton (2016), Tewes (2016), and the literature cited there.

To be sure, the present approach shares these four E-points. Particularly, anticipatory regulations we have begun with, are closely related to the principles of embeddedness and enactiveness; and the critical role of tools in my approach fully corresponds to the principle of extendedness.

However, to my best knowledge no embodiment theory has up to date been devoted to the issue of the origin and the biological basis of specifically human awareness. Rather, several representatives of this approach attacked the hard problem of the origin of elementary forms of sentience or perceptual experience (e.g., Varela et al., 1991; O'Regan and Noe, 2001; Jordan, 2003; Bickhard, 2005; Noe, 2005; Jordan and Ghin, 2006). How successful these attacks have been, should be discussed elsewhere. From my point of view, the sensorimotor theory (Hurley, 1998; Noe, 2005) has not convincingly responded to arguments raised by it critics (e.g., Hardcastle, 2001; Kurthen, 2001; Oberauer, 2001) who indicated that even a best explanation of mechanisms and phenomena of perception does not imply an explanation of perceptual experience, that is, “what it is like” to perceive a red color or a high-pitch tone. If we assume that simple robots do not have conscious experience, the fact that the proposed embodied and enacted mechanisms of perception can be modeled in robots already refutes the idea that these mechanisms can explain consciousness.

The sensorimotor theory is, of course, only one of the embodiment-grounded attempts to explain the emergence of consciousness. Other ("interactivist": Bickhard, 2005, 2016); or ("relational": Jordan and Ghin, 2006) approaches, having a more profound evolutionary foundation, may be more successful in this enterprise. Nevertheless, they have not yet given any systematic account of the transition from the alleged simple sentience to human consciousness, which is the theme of the present paper.

Part 2 above exposed the idea that human consciousness is a secure space where behavioral actions are virtually performed, and their consequences are virtually apprehended. In general, this idea is not new but goes back to the British associationism of the eighteenth century (Hesslow, 2002). In experimental psychology, the concept of cognition as "covert trials" was advanced by Tolman (e.g., Tolman and Gleitman, 1949; Tolman and Postman, 1954) and in philosophy, as the theory of conjectures and refutations (Popper, 1963). It is further in line with the well-known scheme of "test-operation-test-exit" (Miller et al., 1960). About 40 years ago, Ingvar (1979; also Ingvar and Philipsson, 1977) practically formulated the concept of consciousness as anticipatory simulations; unfortunately, he justified his conclusions by brain imaging data which appear to be of questionable quality today, not surprising given the enormous progress of brain imaging techniques since then.

The same idea of covert behavior underlies the concept of efference copy (von Holst and Mittelstaedt, 1950), as well as some control-theoretical models that regard themselves as alternatives to the efference copy theory (e.g., Hershberger, 1998). In the last decades similar views were thoroughly developed under the terms "simulation" (Hesslow, 2002, 2012) and "emulation" (Grusz, 2004). Particularly interesting from the present viewpoint are the data that virtual performance of actions includes anticipation of action results with simultaneous inhibition of the overt execution of these actions (Hesslow, 2012). Behavior, originally realized in large feedforward loops including bodily periphery and the environment, can subsequently be reduced to the loops within the brain.

Notwithstanding the clear similarity between my VR metaphor and all these old and recent views, there are substantial differences as well. Thus the notion of motor simulation frequently defines "behavior" as purely motor activity separated from perception and anticipation of results. The present approach is, in contrast, based on the presumption of the control theory that behavior is control of input rather than control of output and cannot, therefore, be regarded as a set of commands sent to muscles. The very sense of a virtual behavior is obtaining its virtual consequences. A related minor point is the idea shared by many adepts of simulated behavior that a motor system has some "point of no return," so that when a simulated motor activity attains this point, the movement cannot be inhibited anymore and must be executed. The concept of the "point of no return" is a leftover of motor control ideas of the nineteenth century and has no place in the modern movement science (e.g., Latash, 2008, 2012).

But notwithstanding these rather minor differences between all these approaches (regarded above in a cavalry manner) and the present one, there is a very big difference in the kind of explanation. The primary interest of simulation theorists is a how-explanations. They ask, how, i.e., using what kind of mechanisms, virtual behavior is realized. My point, to the contrary, is a why-explanation: why virtual behavior is realized thus and not differently. For example, without the phylogenetic roots in playing behavior, simulated activity could not possess its astonishing freedom to initiate any virtual action in any circumstances, to interrupt or terminate at any deliberate point and to re-start at any moment. The components of communication and tool usage also have profound effects on the nature of human consciousness, as we shall see in the next session.

Language and Thought. The matter of this section is not properly a theory or a class of theories but rather a group of loosely related views, converging on a literal understanding of "con-sciousness" as "shared knowledge" (lat con-scientia). Thus consciousness is regarded as the product of cognitive activity converted into a form of language to be shared with others. The idea that, roughly speaking, "human consciousness is animal consciousness multiplied by language" has, in fact, become a matter of general consensus as a component of almost all theories of consciousness, even between the authors so different as Edelman (1989), Dennett (1991), Maturana (1998), Järvilehto (2001a,b), and Humphrey (2006), who barely agree at any other point. Indeed, what else is specific for human (in contrast to the animal) consciousness if not the fact that it is based on social cooperation and language-mediated communication?

Crudely, many socio-linguistic theories may be classified into pre-structuralist (e.g., Vygotsky), structuralist (e.g., Levi-Strauss) and post-structuralist (e.g., Derrida). The first stress the process of internalization in which social (interpersonal) processes are transformed into internal cognitive (intrapersonal) processes. Consciousness, from this point of view, is the pattern of social relations (for example, a child-parent interaction) transported into the head. The second class of theories contends that consciousness is based upon hidden cultural and linguistic stereotypes (e.g., the opposition "cultural" vs. "natural") creating stable, largely a-historic structures. The third view insists on the virtually absolute relativity of the structure and content of conscious human behavior and (in contrast to structuralism) its historical and ideological interpenetration.

Above, when discussing the interaction of communication and play, we already mentioned that human consciousness is frequently regarded as a symbolic game, and that this view is usually traced back to Wittgenstein: "The limits of my language mean the limits of my world" (Wittgenstein, 1963; Section 5.6, emphasis in original).

This view, however, leaves unclear wherefrom the structures (or the rules of the game) take their stability and causal power if they are not filled by the content of a language-independent world. Post-structuralists capitalized on this inconsequence and proposed a radical solution for the above problem: if consciousness does not have any meaningful content besides the rules and structures of the game, then, it does not have any rules and structures either (Derrida, 1975). Thus even the notion of symbolic game became much too restrictive since it may imply that there is something the symbols stand for—but in fact, they stand for nothing. Any kind of human behavior is just a "text," which can be interpreted in a variety of possible ways. For itself (i.e., before and beyond this process of interpretation) there is no such thing as the meaning of an action. Also the world, the so-called "nature" or "reality," is a text to be interpreted and deconstructed (Foucault, 1966). Not only, therefore, everything is merely a sequence of signs, but these signs do not signify anything: the classical opposition between the signifying and the signified (de Saussure, 1983) is thus annulled. Hence, consciousness is not a game, as previous socio-linguistic theories regarded it, but rather a free play (Derrida, 1975) whose rules may appear and disappear like clouds in a windy day. From the early socio-linguistic point of view, consciousness is its own manifestation in systems of signs. From the later socio-linguistic point of view, consciousness is just these systems of signs and nothing more. "Cognition is a relationship of language to language" (Foucault, 1966; Ch. 1.4).

One can say that these views evolved from the theories of socio-linguistic foundation of consciousness, peaking in the linguistic determinism in Wittgenstein (1963) and Whorf (1962), to the theories of the unlimited freedom of consciousness in its historic and linguistic realization. This freedom, from their (and my) point of view, largely roots in the freedom of the sign, which, in its development from index to symbol, abandoned its causal link to its reference. Importantly, the notion of language as a symbolic game is not limited by syntax. Rather, it is the very meaning of the words which is determined by their location within the network of tacit verbal rules. E.g., we cannot understand the meaning of the word "hard" without its oppositions such as "soft" or "easy." Also the meaning of mental concepts is nothing but their usage in language, i.e., their position in the linguistic game. Understanding consciousness means understanding how the term "consciousness" is used in our culture (Bennett and Hacker, 2003).

Because many very influential linguistic theories originally accrued in philology and cultural anthropology, they may appear to concern only particular forms of consciousness expressed, e.g., in arts and letters but not the basics of human consciousness. This is not true. These ideas profoundly affected the contemporary thinking on mind and consciousness down to the level of such "elementary" functions as visual perception (e.g., Gregory, 1988, 1997) and neural development (Mareshal et al., 2007). They left their trace even in strongly biological approaches to cognition and consciousness (e.g., Varela et al., 1991; Maturana, 1998).

From the present point of view, socio-linguistic theories correctly emphasize communication and play as important sources of human consciousness. Most elaborated of them also stress its prospective nature making conscious behavior "free" in the sense of being not determined by the past.

However, all these views, traditional and contemporary, philosophically or biologically oriented, completely miss the instrumental nature of human behavior. Many of them talk about tools; e.g., they regard words as tools, scientific theories as tools, etc. But besides this, our consciousness is based on simply tools, which are not words, not theories, just tools. Using them, we either attain our goal (if we correctly grasp the objective relation between elements of the environment and their properties), or not (if our conceptions are wrong). Thus the results of tool usage continuously test the validity of our symbolic games. “By their fruit you will recognize them”(Bible: Mt. 7, 16). This fruit is the banana, which Köhler's (1926) apes reached using sticks and boxes. If their concepts of sticks and boxes were true, they reached the banana, but when they were false, they remained hungry.

It is true that, e.g., a building can be regarded as a “text,” and that the architect may have projected his personality into his drawings. But in addition, the building has to withstand gravity, wind and possibly earthquakes. To understand the meaning of “hardness,” it is important to recognize its relationships within the field of its use in the language (e.g., the hardware/software distinction). But it is also important to remember that our ancestors failed to reach bananas using a bundle of straw, simply because the bundle was not hard.

The theory of common working space (CWS: Baars, 1988, 1997) is probably the most elaborated psychological theory of consciousness in the last 30 years. The theory regards the mind as a coordinated activity of numerous highly specialized cognitive modules (Fodor, 1981, 1983) whose work is largely automatic. When some of these specialists meet a processing task for which no preprogrammed solution is available, they build a CWS to make this task as well as all proposed solutions open for every other module. This can be compared with a large audience in which many small groups work each with its own problem, but there is also a possibility to broadcast a problem for the whole audience. Consciousness is this broadcasting; there is a competition for access to it, because the space is only one, and the tasks are many. Therefore, the most interesting processes determining the content of our consciousness are not those which happen in consciousness but those which decide what specialized module(s) should get access to it.

The CWS theory not only provides an explanation for very many characteristic properties of consciousness, but it is also quite compatible with other interesting theories (e.g., reentrance theory), which we cannot discuss due to space limitation.

The metaphor of consciousness behind the CWS model is that of a theater (Baars, 1997). The CWS can be regarded as an open scene accessible for all cognitive modules. The similarity between the theater metaphor and the VR metaphor is obvious. Both presume a scenery, a show, thus pointing to one of the key components of the present hypothesis, i.e., play. Both theater and VR are spaces where things are played.

But in this play, we should not play down the differences between the two metaphors. A theater presumes many spectators, who rather passively observe the actors' activity, whereas a VR is concentrated around a single participant, who is actively engaged in this reality. Furthermore, arbitrariness is much stronger in the theater than in the VR. Millions of people admire opera theater in which they witness how personages express their emotions by continuous singing, which would appear strange and silly in real life.

Also interestingly, the theater metaphor does not warrant the uniqueness of consciousness. Many cities have several theaters, and some people can visit two or three on an evening. Nevertheless, the most established version of the CWS theory assumed that there exists only one common space for each brain (and each body, Shanahan, 2005). Many concrete predictions of the CWS theory result from the assumption of the strong competition between modules striving for the access to the only possibility to broadcast. Later on Baars (2003) suggested that there can be multiple CWSs working in parallel. This raises questions such as: what can count for a space to be regarded as "common," and how many specialized processors (may be only two?) should be connected to build a "partial consciousness."

It cannot be denied that we normally experience one particular state of consciousness each moment, in accord with the old philosophical idea of the "unity of consciousness" (James, 1890). Baars (1997) and Dennett (1991) devoted a lot of intriguing pages to the issue of how this unity can be created by the distributed brain. Neuroscientists (Singer, 1999; Treisman, 1999; Tallon-Baudry, 2004) regard this question as the main question of the neurophysiological underpinnings of consciousness.

Thus we are surprised that we have only one state of consciousness at one time, despite millions of parallel functioning neuronal circuits in our brain. However, we are not surprised when a big animal (e.g., a whale) makes a jump as a whole, although its body consists of many thousands simultaneously (and to a large extent, independently) working cells. We don't regard this unity as a miracle and don't postulate a specific mechanism of binding these cells into a single organism.

Complex behavior is realized in the form of muscular synergies (Bernstein, 1967; Gelfand et al., 1971; Turvey, 1990; Latash, 2008), which dominate the actual distribution of muscle forces each moment of time. These synergies are motor equivalents of the CWS. The unity of consciousness is the unity of behavior. This does not mean that the unity is unproblematic, but the analogy with motor control indicates the correct name for the problem. The motor system does not have a binding problem but must solve the problem of excessive degrees of freedom, also called "Bernstein problem" (Bernstein, 1967; Requin et al., 1984; Latash, 2012). The principle of "freezing degrees of freedom" implies that muscles are not permitted to work independently, but all must remain within a frame of a unifying synergy. With the development of a motor skill, the synergy becomes more and more local until it is limited to those muscles only, whose participation is indispensable.

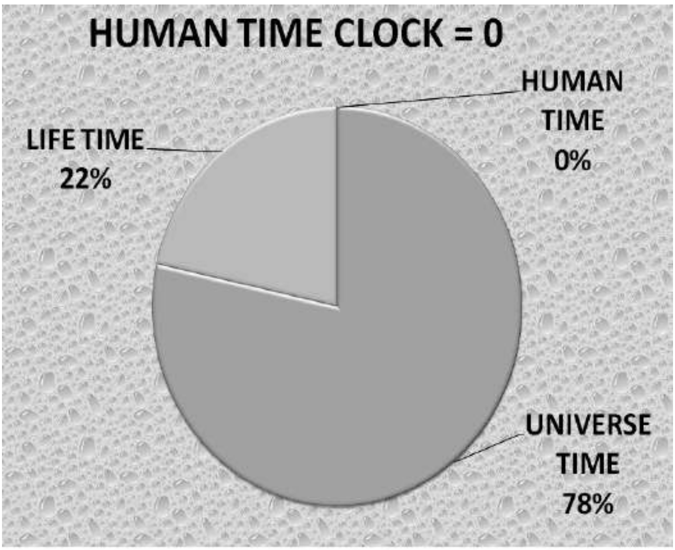
Of course, when we talk about muscles we also mean the whole nervous apparatus these muscles are connected with. Therefore, as far as the unity of the CWS is the unity of complex behavior, there is no contradiction between the CWS theory and the present one. Accordingly, the control of new, unskilled actions is frequently conscious. The question is why the common working place of consciousness is common. From my point of view, it is not because a group of processing modules has decided, in a democratic or dictatorial way, that a given piece of information is interesting enough to make it accessible for the whole audience, but because complex behavior cannot be organized other than by coordinating all activity to a common pattern. Likewise, we do not make two conscious decisions simultaneously not because the two must compete for one scene, but because, if we did make them simultaneously, how would we realize these decisions? The answer is: serially, one after the other.

The model is presented that conceives of human consciousness as a product of a phylogenetic interaction of three particular forms of animal behavior: play, tool use, and communication. When the three components meet in humans, they strengthen and mutually reinforce each other producing positive feedback loop. Therefore, although all three elements of human consciousness are present in many animal species (not necessarily human predecessors), there is no other species that plays, communicates and uses tools as much as humans do.

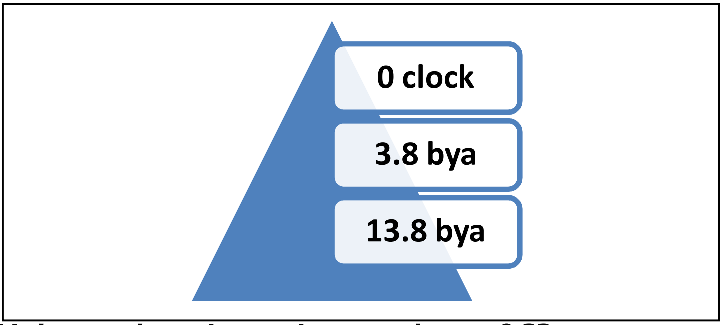
The suggested three-component structure permits to easily explain most typical features of human conscious awareness: its recursive character, seriality, objectivity, close relation to semantic and episodic memory, etc. Other specific features of human consciousness (e.g., the emotion of anxiety) remain, unfortunately, not discussed due to space limits. Finally, a comparison of the current approach with other theories of consciousness (embodiment theories, simulation theories, common working place) reveals, notwithstanding some similarities, important differences from all of them. Again due to space limits, the complex relationships of this model of consciousness with the multiple draft theory, the re-entrance theory, and the classical dualistic approach must remain outside the present text.

4.4. Universe timetable shows human time = 0?

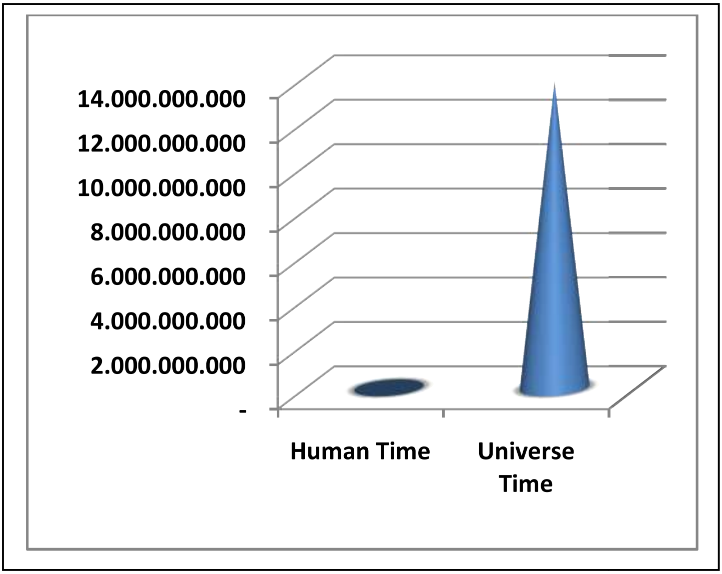
If we predict future human civilization time's 10,000 years, life evolution time's 3,800,000,000 years, and universe time's 13,800,000,000 years. Then we can make universe clock system as follows :



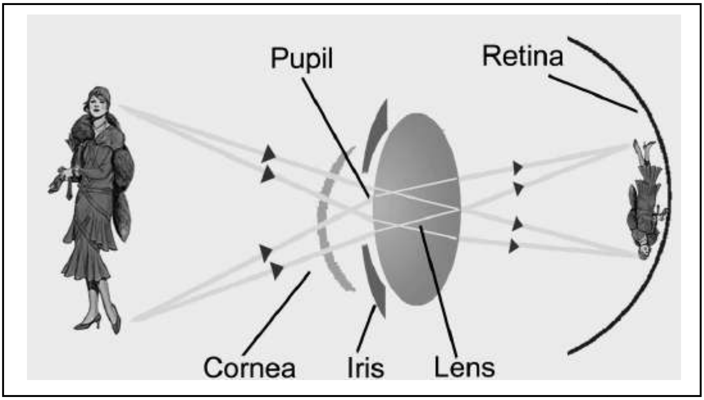
If you look at the time period of the universe which is so long in billions of years, the evolution of life on earth is also billions of years, while the emergence of human civilization was only 6000 years ago, and we are like being awakened from a long sleep. It is as if the clock of the universe's computing time has arrived at 0 o'clock. When the condition is the end of the space-time journey, and a new universe space-time journey is about to begin.



Universe time shows human time = 0 ??



4.5 Who is stealing my mind videos?



Mysterious brain image/video processing. Human technology has reached audio video telecommunications from end to end of the earth's global surface, audio video telecommunications between planets, meaning that in the human brain, there is a black box, an audio video algorithm computing, but it will still be impossible for us to open the mystery of this black box. *Thinking how's the physical explanation of our brain works to make the received image upside down from the eyepiece, then become an image that is always upright, whether there is a switching process or electrical data signal conversion.* The only way to find the audio video format of mind communication, is that we have to find the computational algorithm. But if our own mind is not in our physical body, it means that human technology will not find the black box. Researchers find a better way to measure consciousness.

“What has been shown for 100 years in an unconscious state like sleep are these slow waves of electrical activity in the brain,” says Yuri Saalmann, a University of Wisconsin–Madison psychology and neuroscience professor. “But those may not be the right signals to tap into. Under a number of conditions — with different anesthetic drugs, in people that are suffering from a coma or with brain damage or other clinical situations — there can be high-frequency activity as well.”

UW–Madison researchers recorded electrical activity in about 1,000 neurons surrounding each of 100 sites throughout the brains of a pair of monkeys at the Wisconsin National Primate Research Center during several states of consciousness: under drug-induced anesthesia, light sleep, resting wakefulness, and roused from anesthesia into a waking state through electrical stimulation of a spot deep in the brain (a procedure the researchers described in 2020).

“With data across multiple brain regions and different states of consciousness, we could put together all these signs traditionally associated with consciousness — including how fast or slow the rhythms of the brain are in different brain areas — with more computational metrics that describe how complex the signals are and how the signals in different areas interact,” says Michelle Redinbaugh, a graduate student in Saalman’s lab and co-lead author of the study, published today in the journal Cell Systems.

To sift out the characteristics that best indicate whether the monkeys were conscious or unconscious, the researchers used machine learning. They handed their large pool of data over to a computer, told the computer which state of consciousness had produced each pattern of brain activity, and asked the computer which areas of the brain and patterns of electrical activity corresponded most strongly with consciousness.
The results pointed away from the frontal cortex, the part of the brain typically monitored to safely maintain general anesthesia in human patients and the part most likely to exhibit the slow waves of activity long considered typical of unconsciousness.

And while both low- and high-frequency activity can be present in unconscious states, it's complexity that best indicates a waking mind.

The results pointed away from the frontal cortex, the part of the brain typically monitored to safely maintain general anesthesia in human patients.

"In an anesthetized or unconscious state, those probes in 100 different sites record a relatively small number of activity patterns," says Saalmann, whose work is supported by the National Institutes of Health.

A larger — or more complex — range of patterns was associated with the monkey's awake state.

"You need more complexity to convey more information, which is why it's related to consciousness," Redinbaugh says. "If you have less complexity across these important brain areas, they can't convey very much information. You're looking at an unconscious brain."

More accurate measurements of patients undergoing anesthesia is one possible outcome of the new findings, and the researchers are part of a collaboration supported by the National Science Foundation working on applying the knowledge of key brain areas.

"Beyond just detecting the state of consciousness, these ideas could improve therapeutic outcomes from people with consciousness disorders," Saalmann says. "We could use what we've learned to optimize electrical patterns through precise brain stimulation and help people who are, say, in a coma maintain a continuous level of consciousness."

he role of biophotons in the brain is a growing area of research in neurobiology – and where there are photons there might be quantum mechanics. Betony Adams and Francesco Petruccione explore this developing, and contentious, field of quantum biophysics

The light of the mind is blue, wrote the poet Sylvia Plath ("The Moon and the Yew Tree" 1961). But it seems it may actually be red.

The light of the mind is blue, wrote the poet Sylvia Plath ("The Moon and the Yew Tree" 1961). But it seems it may actually be red.

That's because recent research suggests a link between intelligence and the frequency of biophotons in animals' brains. In 2016 Zhuo Wang and colleagues at the South-Central University for Nationalities in China studied brain slices from various animals (bullfrog, mouse, chicken, pig, monkey and human) that had been excited by glutamate, an excitatory neurotransmitter. They found that increasing intelligence was associated with a shift in the biophoton's frequency towards the red end of the spectrum (PNAS 113 8753).

Admittedly, it is unclear what the measure of intelligence actually is, and the study has drawn criticism for its lack of an explanatory mechanism; correlation, as the mantra goes, does not mean causation. However, the role of biophotons – spontaneous ultra-weak near-ultraviolet to near-infrared photons in biological systems – is a growing field of research in neurobiology.

Light has such symbolic resonance for humanity. It features in art, religion, literature and even in how we talk about knowledge – we speak of “enlightenment” and “seeing the light”, for example. It seems fitting, therefore, that it might play a physiological role as well. Just how light is involved in the signalling processes that constitute the central nervous system and its emergent property, consciousness, is still not clear. But inevitably, where there are photons, there might be quantum mechanics.

Photons, after all, are inextricably linked to the birth of quantum mechanics: Albert Einstein’s 1921 Nobel prize was awarded not for relativity or other discoveries, but for his explanation of the photoelectric effect. He theorized that light, which was conventionally accepted to behave as a continuous wave, might also be considered to propagate in discrete packages, or quanta, which we call photons. This, along with Max Planck’s understanding of blackbody radiation, Niels Bohr’s new model of the atom, Arthur Compton’s research into X-rays, and Louis de Broglie’s suggestion that matter has wave-like properties, ushered in the quantum age.

While the weirdness of quantum theory has lent itself to some unhelpful pseudoscientific interpretations of consciousness, there has been resistance from scientists to yoke the two together. Just because both subjects are difficult to understand, does not mean that they necessarily inform each other. Despite this, the first detailed theory of quantum consciousness emerged in the

1990s from the Nobel-prize winning University of Oxford physicist Roger Penrose and anaesthesiologist Stuart Hameroff from the University of Arizona (Mathematics and Computers in Simulation 40 453). Their "orchestrated objective reduction" (Orch OR) theory has undergone a number of revisions since its inception (Physics of Life Reviews 11 39), but generally it posits that quantum computations in cellular structures known as microtubules have an effect on the firing of neurons and, by extension, consciousness.

The theory elicited a number of criticisms but perhaps the most damning followed from the fundamental tenets of quantum theory. A quantum system – which might refer for example to the dynamics of a photon – is a delicate thing. Conventionally, quantum effects are observed at low temperatures where this system is isolated from destructive interactions with its surrounding environment. This would seem to exempt quantum effects from playing any role in the mess and fuss of living systems. Biological systems, such as the brain, operate at physiological temperatures and are unavoidably bound to their environments. As calculated by physicist Max Tegmark at Princeton University in 2000, quantum effects would not survive long enough to have any influence on the much slower rates at which neurons fire .

However, this objection has to some extent been mitigated by research done in the broader field of quantum biology. The application of quantum theory in a biological context has had most success with regards to photosynthesis but research on the avian compass, olfaction, enzymes and even DNA also suggest that quantum effects might be implicated more generally in the functioning of biological organisms.

In a trivial sense all biology is quantum mechanical just as all matter is quantum mechanical – it is made up of atoms and thus subject to the physical laws of atomic structure first formalized by Bohr at the beginning of the 20th century. The focus of quantum biology, however, is on key quantum effects – those quantum phenomena that seem to defy our classical imaginations, such as superposition states, coherence, tunnelling and entanglement (see box "Quantum phenomena").

If this is the what of quantum effects in the brain, the where is more straightforward. The brain is made up of nerve cells – elongated cells consisting of a cell body, dendrites and axon). Put simplistically, information is passed to and from the brain by the firing or not firing of neurons, a process determined by a nerve cell's electrochemical potential. This potential depends on the spread of charged ions across the cell membrane, making either side of the membrane more or less positive. In order for a nerve to fire, its resting potential must be increased to the requisite threshold potential. How this signal then passes from one cell to the next is still a matter of debate, but the accepted theory is that this neural communication is managed by chemicals known as neurotransmitters released into the synaptic cleft, which then bind to receptors of the next nerve cell, thereby altering its electrochemical gradient and causing neural activation.

What better way to study consciousness than by looking at it in altered states – specifically the chemicals that achieve this, such as general anaesthetics. "The only thing we are sure about consciousness, is that it is soluble in chloroform," said quantum biologist Luca Turin of the Alexander Fleming Biomedical Research Centre in Greece in 2014 . Turin noted that chemicals with anaesthetic capabilities have chemical and structural properties that are very different from each other, leading him to focus on the similar physics that these substances might share. Anaesthetics can bind to various cytoplasmic and membrane proteins. He proposed that anaesthetics facilitate electron currents in these proteins and that this might be demonstrated by looking at changes in quantum spin, where spin describes the magnetic properties of quantum particles such as electrons. What he found was that under the influence of xenon, the simplest of all the anaesthetics, fruit flies showed an increase in electron spin as measured through the use of electron spin resonance (though the origin of the signal is still debatable).

The involvement of anaesthetics in the electronic properties of biological systems is not a completely new theory, having been outlined by Hameroff in addition to Orch OR. What is new is the progress made in understanding how quantum effects might contribute to electronic transfer processes in biological systems. In photosynthesis, there is some evidence that the movement of energy through the structures that constitute the photosynthetic network exploits quantum effects such as coherence (see April 2018 feature "Is photosynthesis quantum-ish?"). Specifically, the structures that seem to allow this coherent transfer are chromophores, the parts of a molecule that give it its colour. Research suggests that instead of moving between the discrete energy levels of an arrangement of chromophores, energy can be spread out or delocalized across more than one chromophore at a time.

What is interesting in the context of quantum consciousness is that nerve cells contain structures such as microtubules and mitochondria that might support coherent energy transfer in a manner similar to that in photosynthesis. Microtubules form part of the cytoskeleton of eukaryotic cells (those with a nucleus enclosed in an envelope, found in plants and animals) and some prokaryotic cells (those with no nucleus envelope, which archaea and bacteria are made of). They provide shape and structure, and are instrumental in cell division as well as the movement of motor proteins. They are made up of polymers of tubulin proteins and within these are chromophores similar to those found in photosynthetic networks. Chromophores are also found in mitochondria, the power stations of the cell. This had led some researchers to suggest that anaesthetics work by disrupting coherent energy processes and in turn disrupting consciousness.

Anaesthetics are not the only chemicals implicated in altered states of consciousness. It is generally accepted that disruptions in the action of neurotransmitters, the molecules by which neurons communicate, contribute to a variety of mental illnesses. Antidepressants, for example, are thought to work by increasing neurotransmitters such as serotonin, the poster-chemical for happiness. However, the exact mechanism of neurotransmitter action is still not perfectly understood. Conventional theory has it that they bind to membrane receptors on nerve cells through a lock-and-key mechanism, where the shape of a particular neurotransmitter matches the shape of the appropriate receptor. The lock-and key mechanism is associated with a number of biological functions, one of which is olfaction (your sense of smell).

However, an alternative theory of olfaction suggests that it may use principles of vibration-assisted quantum tunnelling rather than relying on molecular shape. Recently this theory has been applied to the action of neurotransmitters as well.

Vibration-assisted tunnelling is when the energy of a molecule's movement matches the energy necessary for an electron to tunnel through a potential barrier. In this sense the vibration of a particular neurotransmitter would be recognized by its specific receptor. Using mathematical and computational modelling, researchers tested this by looking at isotopes of different neurochemicals such as serotonin, histamine and adenosine (a review of these studies can be found in AVS Quantum Sci. 2 022901). As their mass changes but their shape remains the same, their vibrational frequencies are altered. The researchers were looking to see whether neurotransmitter isotopes had differing effects, thus disqualifying the lock-and-key mechanism, which depends on shape, and supporting the possibility of vibration assisted tunnelling. Although theoretical results look promising the theory has yet to be firmly supported experimentally.

In quantum biology, the quantum effects of superposition, coherence and decoherence, tunnelling, and entanglement play an important role.

Mathematically, a physical system – for instance an atom or photon – is described by a quantum state that contains all the information about it. Superposition is a property of the quantum world that allows a physical system to exist in two or more quantum states, until a measurement is made on it.

The non-intuitive phenomenon prompted Erwin Schrödinger's famously ubiquitous thought experiment where a cat in a box is simultaneously dead and alive until an observer looks in the box. Quantum coherence quantifies this relationship of states in a superposition. And its counterpart, decoherence, describes the loss of such quantum effects.

Quantum tunnelling, meanwhile, involves a particle passing through an energy barrier despite lacking the energy required to overcome the barrier, as would be defined by classical physics. The phenomenon is not fully understood theoretically, yet it underpins practical technologies ranging from scanning tunnelling microscopy to flash memories.

Finally, quantum entanglement allows two particles, such as photons or electrons, to have a much closer relationship than is predicted by classical physics. Over the years, it has played a central role in quantum technologies such as quantum cryptography, quantum teleportation and networks for distributing quantum information. Over the past decade, physicists have been able to transmit pairs of entangled photons over increasing distances, both in the air and along optical fibres.

A number of animals are able to sense Earth's magnetic field, but exactly how they accomplish this is still an open question. Birds, it has been hypothesized, use quantum effects to accomplish their feats of navigation. This quantum compass is called the radical pair mechanism and it relies on the interaction of electron spin with the geomagnetic field. A radical pair is a pair of electrons whose spins are correlated, existing in a superposition of two different states. The ratio of these states is determined by the magnetic field, resulting in a different chemical signature for different alignments in this field. This spin-dependent compass is thought to be located in molecules known as cryptochromes, which are activated by blue light from environmental cues. Until very recently there was no strong evidence that humans had a magnetic sense. However, a new experiment by Kwon-Seok Chae and team at Kyungpook National University in Korea shows, incredibly, that starved humans can sense the geomagnetic field to orient themselves towards the remembered location of food, an orientation that appears to be blue-light dependent .

It has also been shown by Connie Wang from the California Institute of Technology, US, and colleagues that changes to the strength of Earth's magnetic field cause changes in alpha brain waves – oscillations in the neural activity of the brain in the frequency range 8–12 Hz – in human subjects (eNeuro 6 ENEURO.0483-18.2019). However, it is uncertain whether this effect uses a similar quantum mechanism to the avian compass – in fact, the researchers suggest quite the opposite, that ferromagnetism is responsible for the effect.

In separate studies, changes in alpha waves have been associated with fluctuations in the production of biophotons, measured indirectly by fluctuations in reactive oxygen species, which play a role in cellular communication but are also responsible for numerous bodily problems. They are implicated in ageing, disease and depression and are the reason that antioxidants are so widely touted as being beneficial to health. What is interesting is that studies have shown how magnetic field mediated changes in the spin dynamics of the radical pair mechanism lead to increased reactive oxygen species. It is conceivable, though as yet contentious, that humans use the radical pair mechanism in essential cellular functioning. Exactly what this entails is less clear.

Spin dynamics, the behaviour of quantum particles in a magnetic field, is also at the heart of another theory that suggests that quantum effects play a role in cognition. In this case, however, the spins in question belong to nuclei rather than electrons. Nuclei can have particularly long coherence lifetimes, meaning that their quantum effects persist over timescales long enough to play a role in neural firing and even, possibly, the function of memory.

This notion led physicist Matthew Fisher, from the University of California, Santa Barbara, to suggest that spin-entangled molecules known as Posner molecules might lead to nerves firing in a correlated fashion. This happens through a number of steps. Cellular processes run on energy that is provided by the chemical compound adenosine triphosphate (ATP). When this compound is broken down, it releases phosphates, which are made up of phosphorus (spin-half nuclei) and oxygen (zero nuclear spin). Fisher contends that the spins of the phosphorus nuclei are entangled and that, furthermore, if this quantum entanglement can somehow be isolated from other quantum interactions it might last long enough to have an effect on cognition processes (Annals of Physics 362 593).

He suggests that the phosphates form Posner molecules by binding with spin-zero calcium ions, which act as an effective screen from external interactions. Entangled Posner molecules are then taken up into neurons, bind and release calcium ions, triggering entangled neural activation. Fisher uses this model to suggest why lithium is successful in treating bipolar disorder. Should lithium replace the central calcium ion in a Posner molecule then the non-zero spin of the lithium ion could contribute to decoherence and have a knock-on effect on neural activation.

What is perhaps more surprising with regards to lithium is that different isotopes have been shown to have differing effects on the mothering behaviour of rats. A similar phenomenon has recently been recorded in the action of xenon, an anaesthetic. Na Li and colleagues at Huazhong University of Science and Technology in Wuhan, China, found that differing isotopes of xenon cause differing levels of unconsciousness (Anesthesiology 129 271). This seems extraordinary, that changing something as small as the spin of a nucleus might result in macroscopic changes on the level of something as complex as the mothering instinct or, indeed, consciousness itself. But what's the use?

While the possibility of quantum effects in the brain is intrinsically fascinating, it might also contribute to the ways in which we treat the brain and disorders related to the brain.

Unravelling exactly how neurotransmitters bind to receptors would contribute to understanding G-protein coupled receptors, such as neural and olfactory receptors, which are one of the primary targets of most pharmaceutical intervention. But more than this, identifying how quantum effects might play out in the brain could offer a completely new way of imagining medical intervention beyond the purely chemical. For example, it could help refine and enhance electroconvulsive therapy (the transcranial application of electric currents) and the less well established but also less invasive method of transcranial magnetic stimulation (the use of magnetic fields to stimulate parts of the brain) as treatments for depression.

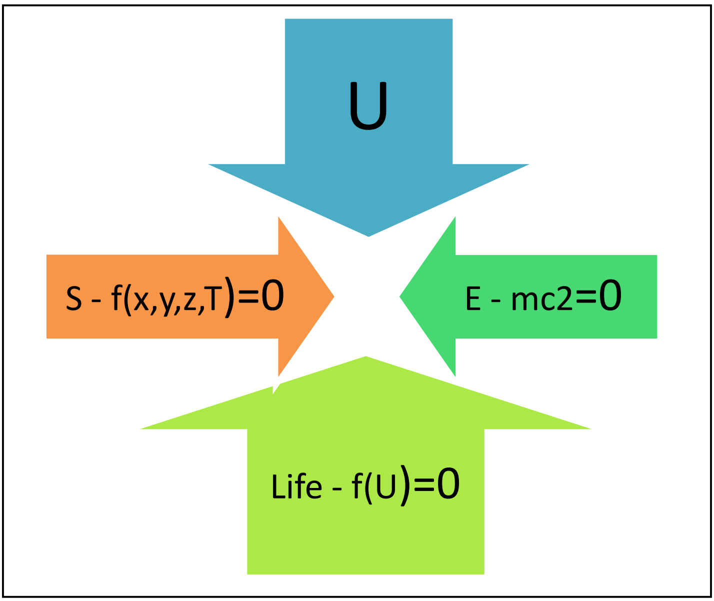
Deciphering the role of light could also be beneficial as a number of recent studies have shown it to have a range of physiological effects. Researchers have found that shrimp exposed to excess serotonin-based antidepressants from human contamination were more likely to seek out light, a result that led to increased predation (Aquatic Toxicology 99 397). While detrimental to the shrimp, this might tell us about how much of our own physiology is responsive to light, and to what extent light could be pharmaceutically useful.

In another recent study, quantum dots – semiconducting nanoparticles capable of producing light – were successfully used to undo the protein clumping linked to Parkinson's and Alzheimer's disease (Nature Nanotechnology 13 812).

V. End Notes from Mohamad Musman

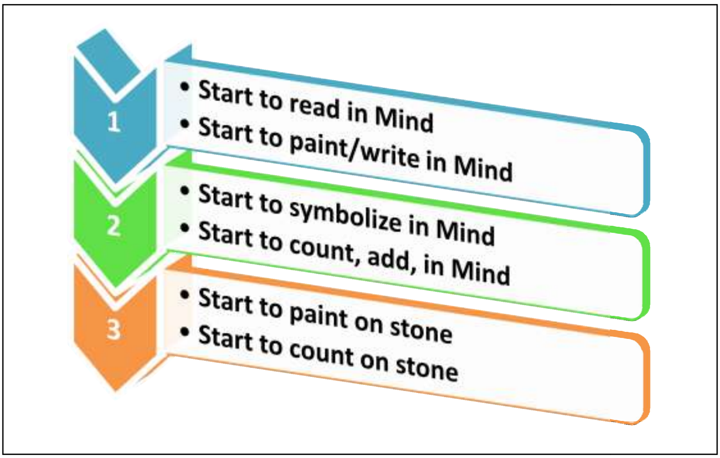
5.1 The math-model of universe game rule

All will die back to where they came from. All is a function of the equation is equal setting to zero or it means the game will limit. Space, time of 13.8 billion years, matter, energy, the evolution of life 3.8 billion years are functions of equality with zero. ***Except for U as the origin of the mathematical computational generating kingdom, it has no similarities.*** This is the essence of the universe game rule. Space, time, mass, energy, and life function related with U.

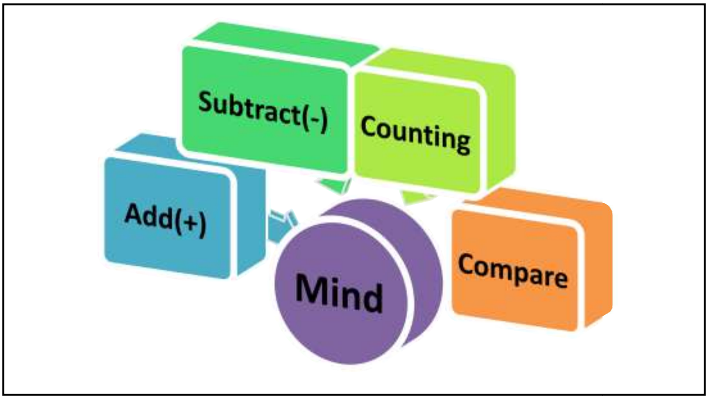


So if we ask who created God, based on above model, the question is wrong. This is because our physical body is an algorithm equation that will eventually die or our game is limited. By definition the rules of the game, then God refuses, does not want to be equated in a function equal to zero. God's source of eternal free will, generating computational algorithm games.

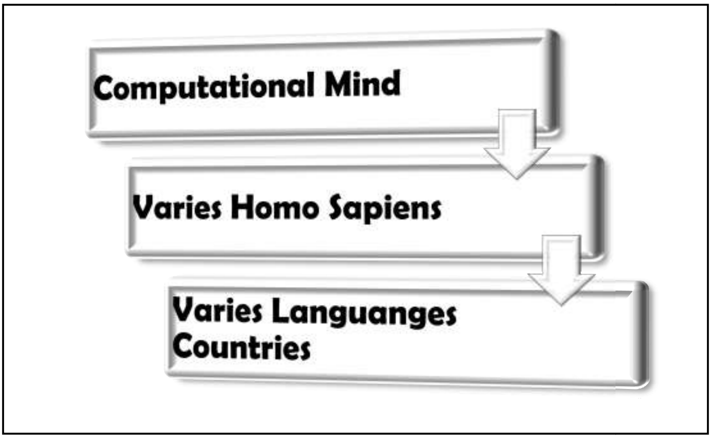
In a certain space of time, when we begin to read our own minds, when we begin to paint and write in our own minds. When we start to make symbols in the mind, when we start the ability to count, add in the mind. So next we start painting on the stone, we start counting everything on the stone. All these events 6000 years ago took place suddenly if measured on a time scale of billions of years of evolution. It's a perfect setting up in space-time travel.



But when we try to find out where the location of the processor component of the mind, a processor component that we usually make for standard computers, it is very difficult to identify it in physics, as if our mind is an embedded mathematical computational phenomenon.

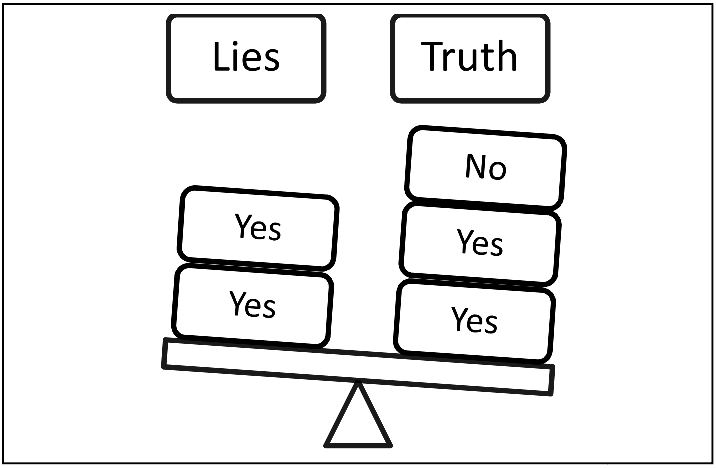


In today's humankind reality, the thinking power of the mysteries of the computational mind and the reality of the ethnic variation of Homo sapiens on earth, this has created thousands of linguistic language variations. and this indicates a pattern of cosmic mind games.



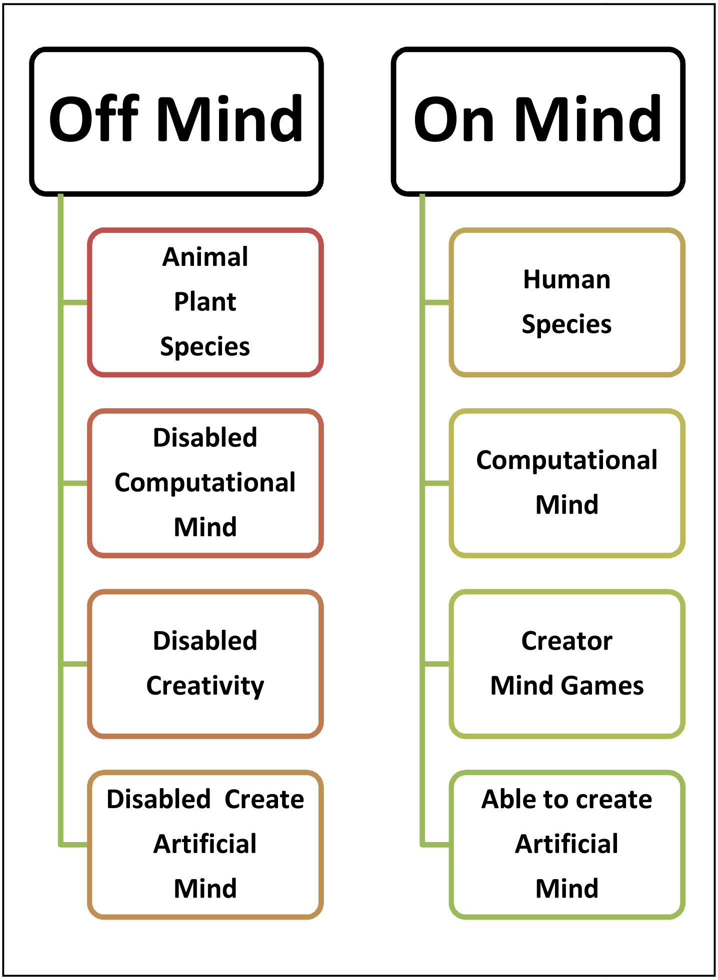
5.2. Future of artificial intelligence philosophy

In the future of open artificial intelligence computing technology, it is very necessary to justify a statement made by a person or group of scientists or physicists who state the truth of science and technology, even though it is on the contrary misleading the future of mankind.

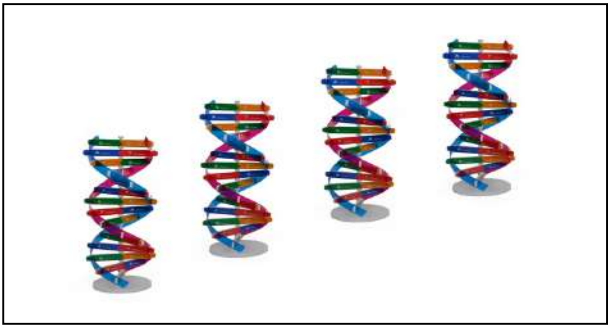


Since the beginning of human civilization appeared, sorcerers have existed, fortune tellers have existed, predictors of the future of a nation. Those are all fields of science and technology, some are telling the truth, some are telling lies.

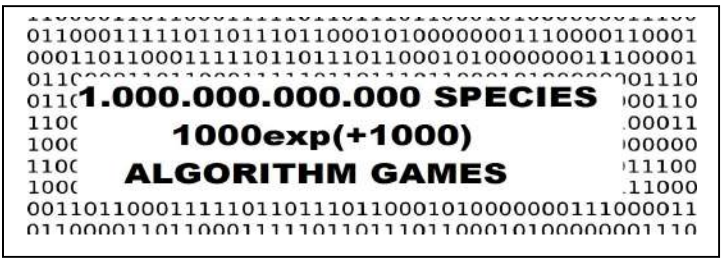
For example, like the search for extraterrestrial planets, which are earth-like planets, in fact this is a lie of science, if no possibility of spacecraft technology can penetrate the journey of millions of years, while the age of civilization is just only 6000 years. Whereas humankind's problems are actually topics of hunger, greed, poverty, lust for war. *It is the right time for world artificial intelligence opportunities to provide real humankind enlightenment in the future.*



An artificial intelligence computing technology can be agreed upon through a treaty agreement by all nations on earth. The actual example at this time is how to actually overcome the covids outbreak, whether in the future it will become a new form of colonial slavery in advanced technology that is controlled only by certain nations. All events in this universe are a beautiful cosmic dance of data information phenomena, a universe of mathematical computational kingdom, our mind's eye will one day be keen to see the phenomena of the universe which are actually mathematical computational data games as the basis for the universe format that makes regulations for physics spacetime design. A game of data of 1,000,000,000,000 species within 1000 exp(+1000) algorithm games.



1000 exp(+1000) algorithm games:

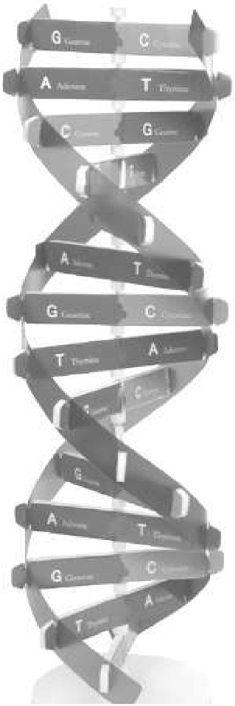


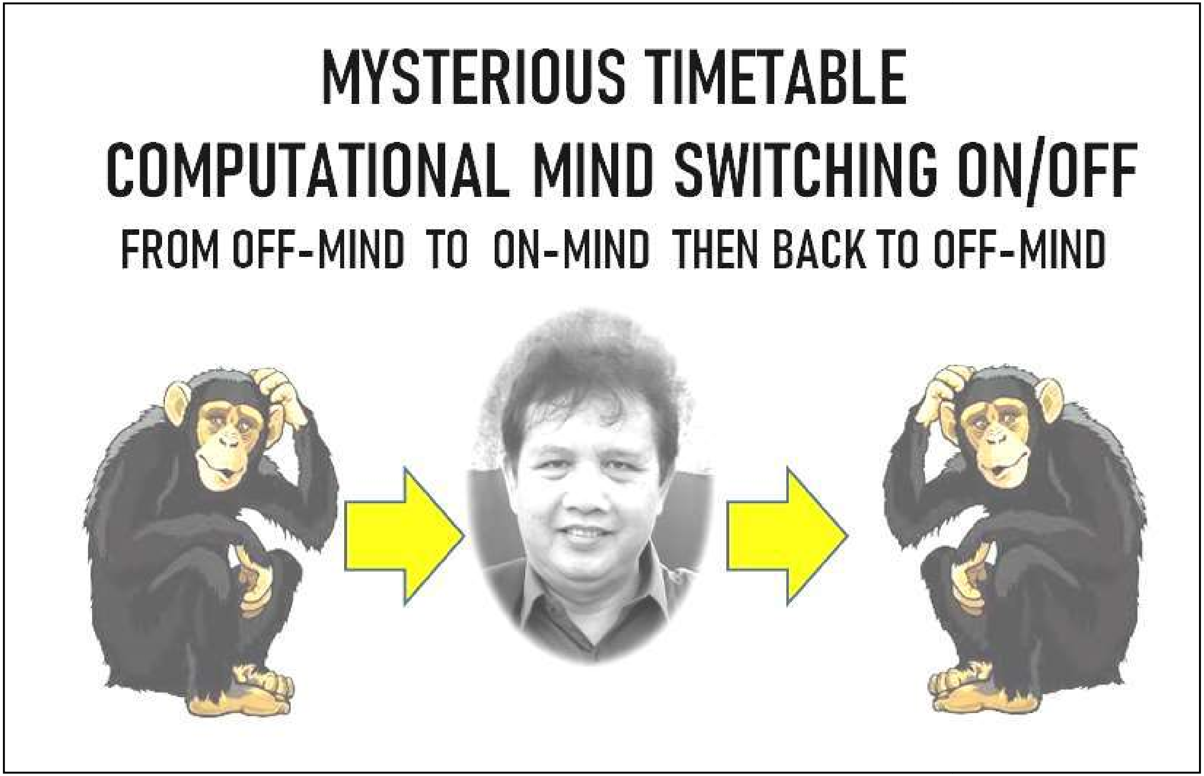
If indeed the mind is a phenomenon in the final stages of a long space-time journey of 13.8 billion years, which appeared in human civilization, then the evolution of civilization that started from religious messages 6000 years ago, it is a real mind game, which seems extreme, as extreme as the giant mass energy of galactic stars, but the degree of its information value is meaningless to the core of the mind games as the main stage. Stars and galaxies are totally background stages, it is all accessories.

Billions humanity is now online in universe mind consciousness final network. What we see from the phenomenon of the extreme boundaries of the universe, from the limits of mathematical computational phenomena that form the regulation of space-time physics, then the limits of mind games from the 3.8 billion year life evolution journey is also very extreme with huge data information, the extreme color of religions, civilization clash, colonialism, human slavery, money slavery, greed, the desire to live without dying. Religions are right in praying of miracle invisible helping hand to decipher future fate of mysterious timetable of civilization on Earth. ***Future artificial intelligence shall be visible helping hand to improve quality of humanity itself.***

Musman-2021

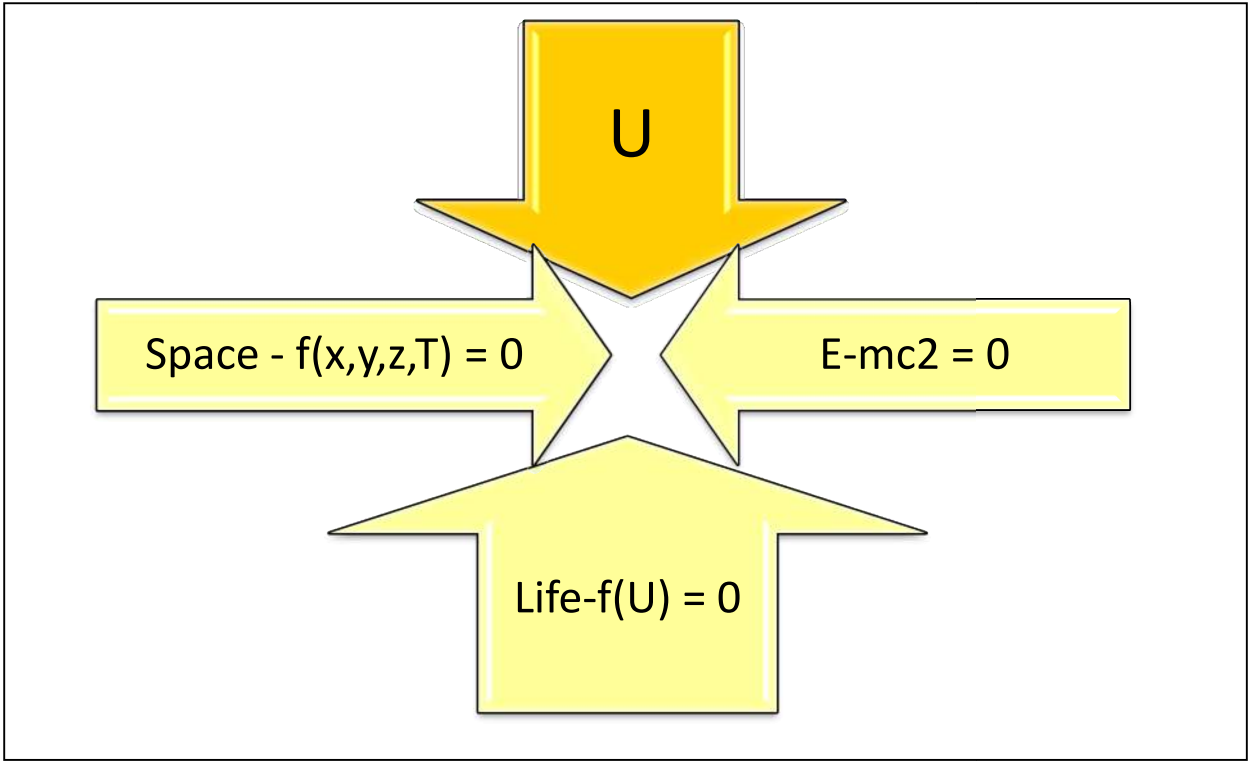
UNIVERSE CONSCIOUSNESS OF HUMANKIND IS NOW ONLINE



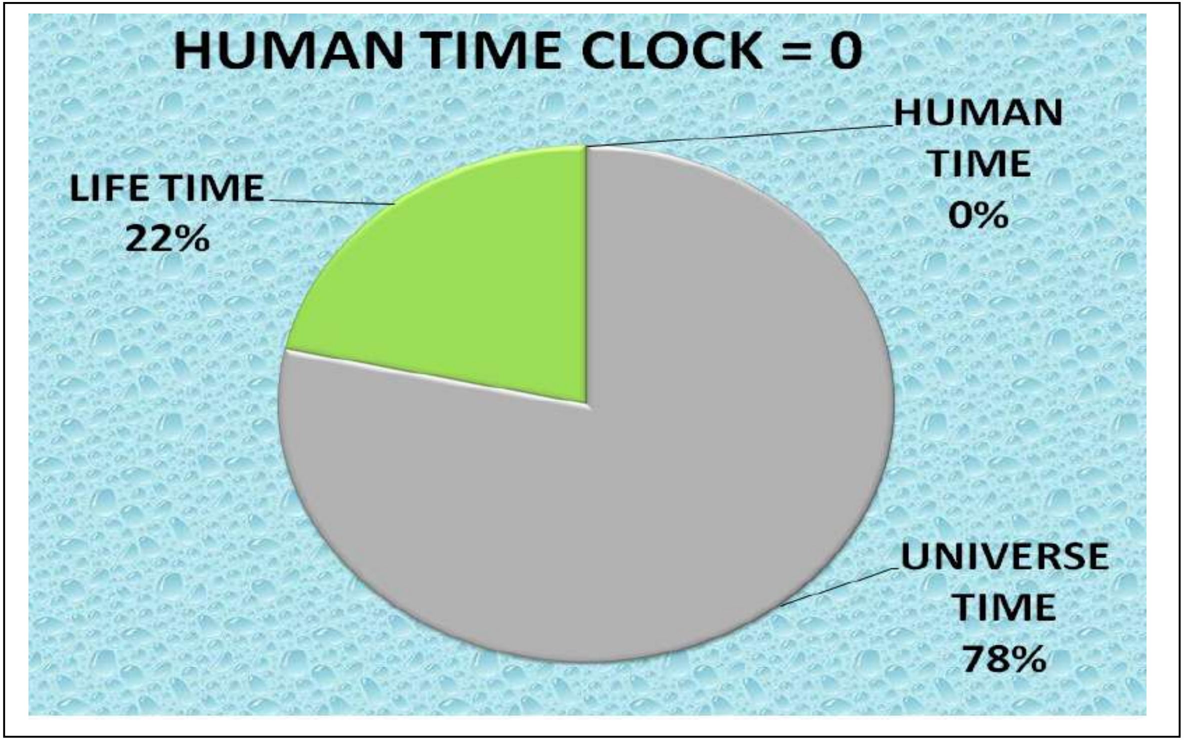

MYSTERIOUS TIMETABLE
COMPUTATIONAL MIND SWITCHING ON/OFF
FROM OFF-MIND TO ON-MIND THEN BACK TO OFF-MIND

6000 YEARS MIND JOURNEY OF HUMAN CIVILIZATION

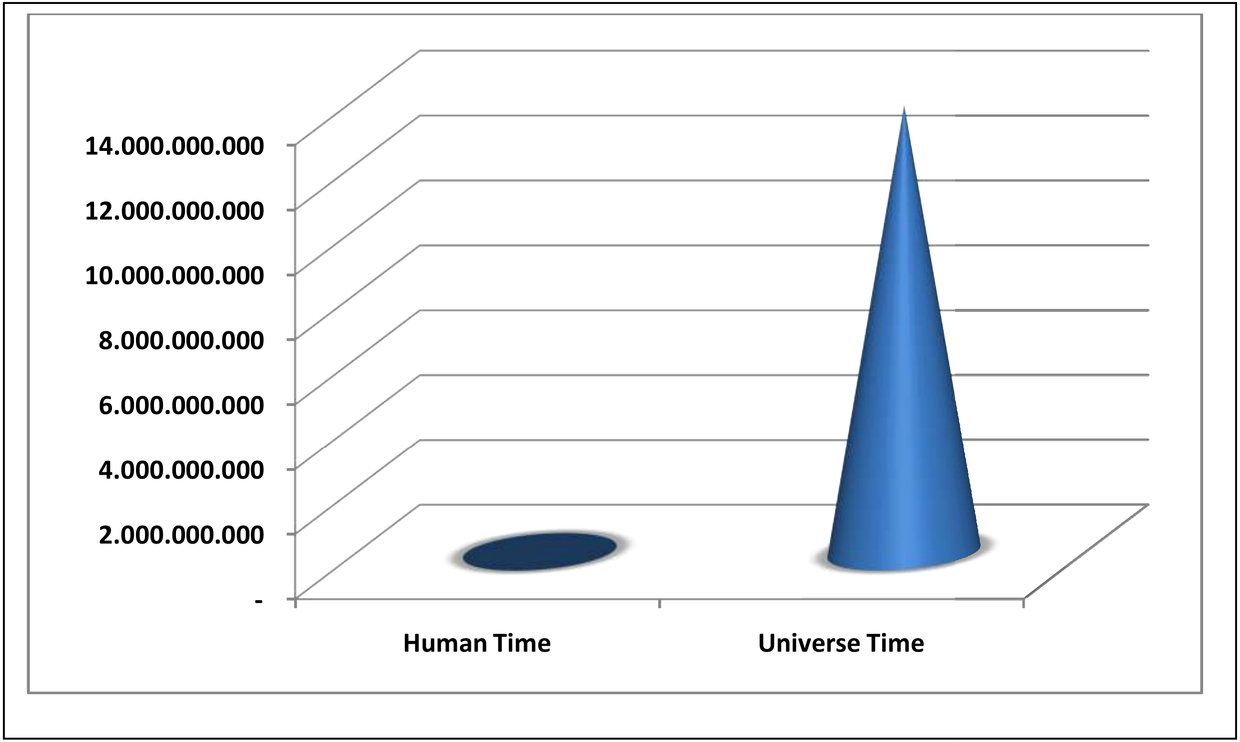
MATH-MODEL OF RULE ESSENCES OF UNIVERSE MIND GAME



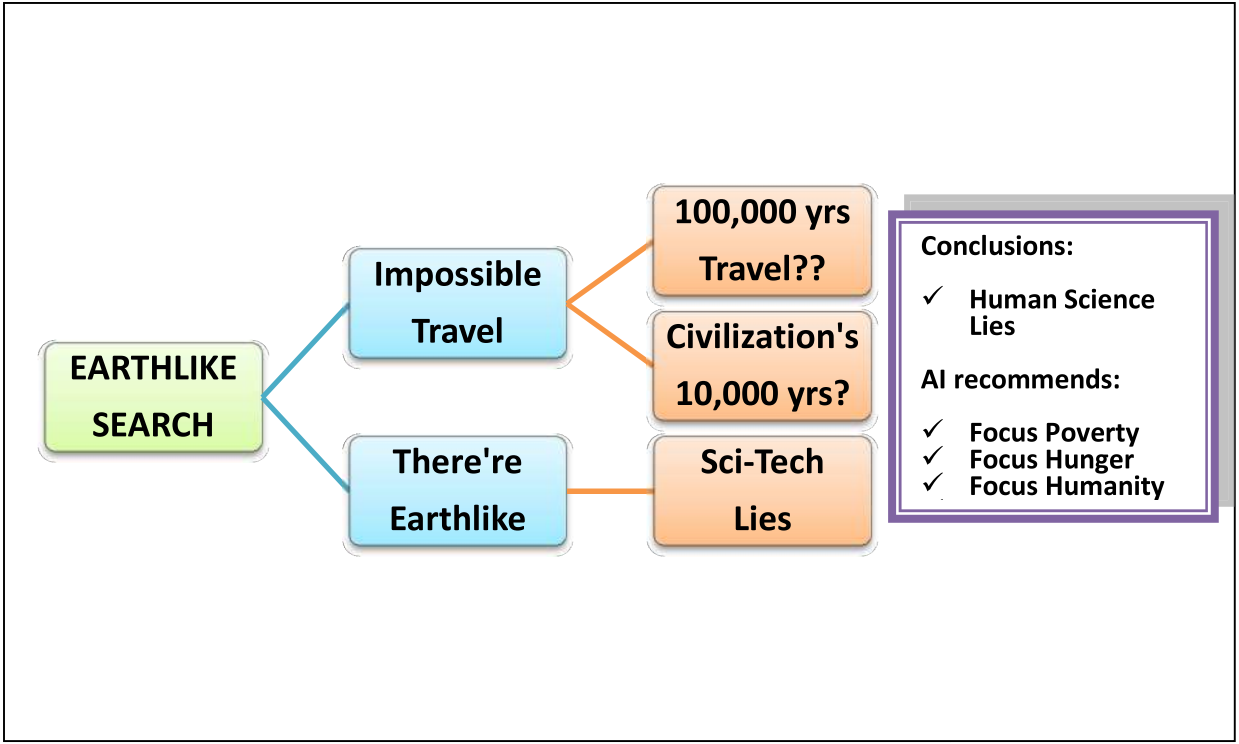
Universe timetable shows human time clock = 0



Universe timetable shows human base time = 0



UNITED FUTURE - HUMANITY ARTIFICIAL INTELLIGENCE (AI) PROJECTS



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Mysterious Mathematical Computational Mind in Human Brain

It started from our dawn civilization around 6000-50K years ago. We're "switched on" to read/write in mind. We started to paint on stone. We started to count, add, subtract in mind. We started to write numbers on stone. We started a civilization. Then we read/ write universe space time journey history. It is easy to create micro-processor of counting, adding, for a computer. But it looks impossible to identify this simple processor in our billion neurons of our brain. It is very very near our neck, but it will be forever untouchable dark. Let's follow debates and arguments of our cosmology.

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