

The Anthropic Principle



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Short Communication

The Anthropic principle is based on three postulates:

- Fundamental constants are pre-existing in the Universe.
- Each constant has an exact value.
- If one of these constants had a different value, life and accordingly human species would not exist.

The use of the word principle is quite exceptional in physics ; therefore it raises a serious suspicion. A technical analysis should allow for evaluating the relevance and for checking the legitimacy of this alleged principle. For this purpose, we need to develop some particular issues. The role of a theory ; The accuracy of semantics and terminology; The field effects ; The physical laws ; The Big Bang and time zero ; The origin of human species ; The fundamental constants ; Determinism and chance [1].

The Role of A Theory

In The Histories, the Greek historian Herodotus (484-425) demanded to know with a scientific certainty (Book II, 119). Science strives to know what is, Science never says what must be, what should be, to comply the desires of Researcher or to satisfy their dreams. Reality is so complex with regard to our intellectual abilities, that our vision of this reality has necessarily a large part of interpretation. This is why it is required to use mathematical modeling, in order to evaluate and predict events. Contrary to philosophy, contrary to political, economical and religious ideologies, science is not in favor of a right-wing or a left-wing party, in favor of such or such culture, in favor of such or such belief, such or such object. In addition, scientific research doesn't depend on culture or psyche of researchers. Research is not based on desires, on religious beliefs or on philosophical convictions. In Introduction to Psycho Analysis published in 1916, Freud (1856-1939) recommended his students not to

decide according to their sympathies or their antipathies, and in Aurora, published in 1881, Nietzsche (1844-1900) wrote that convictions are enemies of the truth. A physical theory is intended to enrich and organize knowledge. All assertions must be proven; these assertions remain conjectures as long as they have not been demonstrated. In order to be able to avoid certain misleadings, we are supposed to use an accurate semantics, as well as an appropriate terminology, and beware of the field effects.

The Accuracy of Semantics and Terminology

It's timely to recall the difference between a reality and the corresponding concept. A concept is the idea that one has about a reality or a phenomenon ; it has no physical existence. A reality has physical properties while a concept has not. Accordingly, a reality is measurable while a concept is not measurable ; Contrary to everyday language, we do not measure the length of a table, because length has no physical properties, it's a concept : in fact we measure what separates the two ends of the table ; the result is called length of the table ; Contrary to everyday language, we do not measure the duration of a phenomenon ; in fact we read what the clock indicates (Figure 1). The result is called duration of the phenomenon ; Light exists in the Universe, but its speed doesn't, because speed is a concept. We don't measure speed of light : we make measurements on light, instead of speed, and the result is called light speed . There is no measurement of time, because time and duration are concepts, without physical properties. The concept of origin of time is an illusion, a kind of myth, which leads the mind to a trap ; Time is not a phenomenon ; it does not exist in the Universe. Consequently, the beginning of time does not exist: there is no time zero; the Big Bang is not the start of time. Indeed, the first trace of time is a cuneiform sign inscribed on a clay tablet ; it was discovered in Mesopotamia and it's dated between 4800 and 4500 years ago. The meaning of this sign is lunar month (Figure 2).

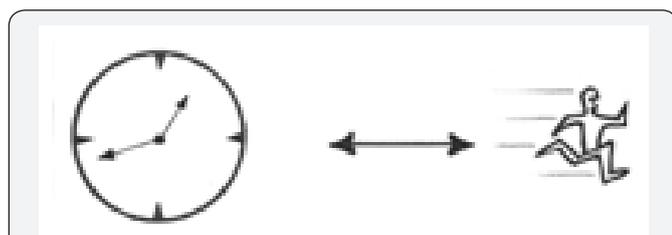


Figure 1: Duration is what the clock and the runner do simultaneously.

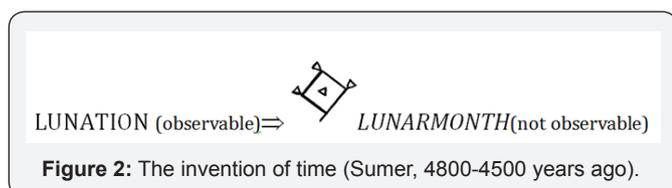


Figure 2: The invention of time (Sumer, 4800-4500 years ago).

After observing repetitions of the movements of the Moon (lunation), Sumerians invented the first unit of time, the lunar month. It must be emphasized that the lunar month does not exist in nature; it is a prodigious invention of Sumerians. In the same way, the invariant concept of space-time used by the theory of Relativity, is not observable, and it does not exist in the Universe : Einstein invented the concept in 1905.

Ex: Ab ovo, ab galline ? Which came first, the egg or the hen ? Paleozoology has already answered this recurring question : the hen descends from a small birdlike carnivorous dinosaur of the same family as caudipteryx zoui (China, c. 120 million years old), which was oviparous. The use of the concept of time allows one to prove that the egg came before the hen.

Ex: In De Rerum Naturae (The Nature of Things), the Latin poet Lucretius (c. 95-55) already wondered whether the world had an origin.

According to our current knowledge, the Big Bang happened about 13.7 billion years ago (with an accuracy of 200 million years); it can't be considered the origin of the Universe and it's not the start of time either. In Satires, the Latin poet Persius (34-62) was the first in asserting that ex nihilo nihil (from nothing, nothing). The Big Bang would have been caused by quantum fluctuations; but these fluctuations compromise the idea of empty space; therefore, the quantum vacuum is not empty, and the Big Bang is not the beginning of the Universe. Indeed, the empty space has no physical properties; therefore, it does not physically exist: it's a pure mathematical concept.

There is another interesting argument; sometimes, the cause of a phenomenon comes after the effect:

EFFECT (before the cause) CAUSE (after the effect)

Ex: Preparation of a trip: make one's suitcase is an effect which happens before the trip, which is the cause.

Ex: Memento mori means Remember, thou art mortal (Genesis): remember (present) that you'll die (future).

These violations of the law of causality are somehow confirming the non-existence of time.

First conclusion: A concept must not be regarded as a reality. Reality is observable ; a concept is not.

The Field Effects

The perceptual illusion was theorized by the Swiss psychologist Jean Piaget (1896-1980); a primary field effect is a disruption of perception as well as a disruption of interpretation of an object or a phenomenon:

Ex: Claustrophobia and vertigo are examples of primary field effects; Judging ancient cultures with our current models is being likely to produce primary field effects.

We have introduced two more precise developments of the field effect; the technical field effect and the field model effect:

a) The technical field effect is a misinterpretation of a phenomenon or a reality:

Ex: A watercourse suggests the irreversible passage of time ; the idea is driven by a technical field effect.

Ex: Certain objects of nature or certain phenomena, such as skyline, honeycombs, waves on the surface of water, objects in number, may suggest that mathematics exist in nature; but contrary to mathematical objects, naturalia are not perfect; these suggestions are driven by technical field effects.

Ex: The confusion between rhythms and time is driven by a technical field effect. A rhythm is observable, time is not:

RHYTHM (observable reality) \Rightarrow TIME (concept not observable)

Of course these rhythms are used for building clocks ; such as atomic clock which is based on the Cesium 133 oscillations.

Ex: A particle going back on its trajectory does not go back in time. Indeed the physical state of the particle has changed between going and returning; because the particle is in interaction with the rest of the Universe, whose physical state changes permanently.

Therefore, assert that a particle is able to go back in time, is a mistake driven by a technical field effect.

b) The field model effect causes a misinterpretation of mathematical models :

Ex: The effective factor of distance traveled by a train is speed ; duration is only what the clock of railway station indicates (Figure 1).

Consider that duration is an active factor is a conceptual infringement.

Ex: In the equation of Einstein $E = mc^2$, mass and energy are considered equivalent, because they are proportional ; but they are not identical, because their physical properties are radically

different.

Second conclusion : One must beware of field effects.

The Physical Laws

In *Parallel Lives*, the Greek historian Plutarch (c.46-c.126) used the expression principles of nature to designate laws of nature (Life of Camille, 3, 1). In *The Nature of Things*, Lucretius called them the principles of things (Song 1, 55), and he talked about the sublime law of heaven and gods (Song 3, 54).

The basic principle of Roman Law *Lex imperat* (the law dictates), is not true in physics : physical laws are describing the Universe ; they prescribe neither the physical state of the Universe, nor the evolution of its state. In other words, a physical law is a passive concept for evaluating and predicting ; by itself's not an active factor of evolution of the Universe.

The Universe is not evolving according to a law ; *ex lege* would say Cicero (106-43). It's the opposite : the physical laws describe how the Universe is , what the Universe does , and what the Universe is going to do . Studies of Universe allow establishment of laws with the help of mathematical models. These laws make some predictions of events possible. It is important to emphasize that laws of physics are driven by the observation of the Universe :

UNIVERSE (reality) \Rightarrow MEASURES \Rightarrow PHYSICAL LAWS (concept)

It is the reason why, instead of laws of the nature or laws of the Universe , we should use expressions more consistent such as laws of thermodynamics , laws of gravity , laws of biology , laws of physics , physical laws , because each specific law is a construction of thought.

The permanent progresses done by research, make that numerous current laws are provisional ; some of them will be replaced, some of them will be corrected, new laws will emerge : the inevitable diachrony of physical laws, which results from the evolution of the laws, is a major part of scientific progress. In *Mein Weltbild* (1934) (How I see the world - Flammarion - 2009), Einstein wrote that laws are only temporary solutions to our conceptions of reality. Physical laws are descriptive instead of prescriptive ; ultimately, they are allowing researchers for having an identical view on each issue. The accuracy of physical laws is sometimes called into question, although scientists always indicate the accuracy of measurements and calculations, contrary to politicians, demographers, economists, statisticians, sociologists, etc.

The propagation of misconceptions or doubts about the accuracy of physical laws is unacceptable: in *The Nature of Space and Time* (Princeton University Press - 1996), Stephen Hawking & Roger Penrose wrote that the precision levels are 10^{-11} in Quantum physics and 10^{-14} in Relativity. These high levels of accuracy are resulting from the extraordinary development of high technology and advanced techniques.

The repetition of train crash or airplane crash make one to consider that the cause of these crashes is the law of series : it's totally wrong because the basic function of a law is the prediction of events ; well, a train crash or a plane crash is unpredictable. No law is the cause of a crash. No physical law is the cause of a phenomenon, whatever it is.

Third conclusion : Physical laws are conceptual ; they don't drive the evolution of the Universe.

The Big Bang And Time Zero

Big Bang theory is contrary to the finger of an anthropomorphic God, such as the one painted by Michelangelo on the ceiling of the Sistine Chapel, it is contrary to the biblical version of the creation, it is contrary to Gilgamesh epic (Sumer, c. 2700 BC), it is contrary to Egyptian cosmogony, to Bambara, Dogon and Zoroastrian cosmogonies. None of these theogonies mention the Big Bang, although Gods were supposed to know everything. Time is not a phenomenon ; it does not exist in the nature ; therefore, there is no start of time, and the Big Bang is not the beginning of time.

Fourth conclusion : There is no start of time.

The Origin Of Human Species

Paleozoology and paleoanthropology have step by step demonstrated that life started about 4 billion years ago and that human species started between 2 million and 400,000 years ago. According to Bible logographers, it took six days. Of course, dating criteria are conventional. We just can say that the evolution of the Natural environment was favorable to a progressive and slow organization of matter and energy towards nature and life. The evolution keeps going, and it would certainly be pretentious to assert that human beings are the ultimate step of this evolution.

Fifth conclusion : The history of human species is a short parenthesis in the history of the Universe.

The Fundamental Constants

According to the anthropic principle:

- i. The fundamental constants are physically existing in the Universe.
- ii. The fundamental constants play an active role in organizing the Universe.
- iii. The exact value of each constant has been predetermined to allow the advent of life , and mostly the advent of human species .

It's obviously timely to remind the origin and the role of fundamental constants.

Fundamental constants are mathematical concepts which are completing the mathematical models. A constant is always a consequence of measures on reality and calculations. It has no physical existence, which deprives it of an active role in the organisation of the Universe.

UNIVERSE MEASURES + CALCULATIONS CONSTANT

The diachrony of fundamental constants, i.e. the evolution of their value, destroys the double myth of exact value and predetermined value. No fundamental constant has an exact value. This diachrony is mainly caused by more accurate measurements and by more efficient models. New models will also imply new constants.

Ex: Let's remind which way the oldest constants have emerged: In The Histories, Herodotus specified the distances travelled by using three different units: day of walking, day of navigation and month of navigation. These units lead to speed units: walk in a day, navigation in a day, or navigation in a month.

For instance, the walk in a day is the distance travelled by an army in one day. It was the average speed of Persian army, of Greek army, of Egyptian army, of the army of Alexander The Great ... approximately 30 km per day; it was less than 25 km in the case of retreat, according to Herodotus and according to the Greek historian Xenophon (c.430-c.355), who was also a military leader. 30 km per day was a constant specific to armies of that time. Therefore the distance travelled reads:

$$DAYS OF WALKING = AVERAGE WALK IN A DAY \times NUMBER OF DAYS$$

The number of days of walking informed the general and his soldiers on the duration and the distance they had travelled or that they were going to travel.

The speed units walk in a day, navigation in a day and navigation in a month don't exist in the nature, because they are consecutive to the environment, to the composition and the discipline of the army, to the efficiency of command. They can be considered first steps towards the invention of the concept of physical constant.

Ex: The value of the spatial constant π , also called constant of Archimedes, the Greek savant (287-212), results from the division of the circumference of a circle by its diameter; it's the same for all circles:

$$CIRCUMFERENCE / DIAMETER = VALUE OF CONSTANT \pi$$

The number π is incommensurable, and currently known to 10^{13} decimal places. It's also a relative invariant, because π is deprived of physical properties.

Ex: The speed of light is measured from experiences done on electromagnetic waves, instead of speed. In L'Astronomie Populaire (1881), Camille Flammarion discussed some of the first results of measurements: 315,000 km/s by Fizeau, in 1849; 298,000 km/s by Foucault, in 1850; 300,400 km/s by Cornu, in 1874. In 1983, the Conférence Générale des Poids et Mesures (General Conference on Weights and Measurements) decided to set the exact value:

$$c = 299,792,458 \text{ m/s}$$

It put an end to the diachrony of the speed of light.

MEASURES ON E.M. WAVES + DECISION OF CGPM \Rightarrow VALUE OF c

Ex: The Planck's constant is defined by the ratio between the energy of a wave and its frequency:

$$h = E / \nu$$

In 2011, the CGPM decided to set its exact value:

$$h = 6.62606 \times 10^{-34} \text{ J. s.}$$

The symbol X represents the digits to be added according to the most recent CODATA adjustment (Committee on Data for Science and Technology). Therefore the diachrony of h is not ended.

We could make the same technical investigation through the various constants used by physics, and come to the same conclusion as above: the fundamental constants, whose value is approximative, are passive consequences instead of active factors. The expressions constant of the Universe and constant of the nature are inappropriate because these constants do not exist as such in the Universe or in the nature: they are concepts. It's recommended to use the expressions physical constant, or constant of physics, or chemical constant or biological constant, etc.

Sixth conclusion: The fundamental constants don't exist in the Universe; they are conceptual.

Determinism And Chance

In *Le Hasard et la Nécessité* (1970) (Chance and Necessity), the biologist Jacques Monod contended that every living things result from chance and determinism.

Monod made a double mistake:

- i. Chance and determinism are not phenomena: they are concepts
- ii. Determinism is a special case of chance.

They are both concepts instead of physical phenomena, because they have no physical properties.

Determinism and chance are not active factors. They don't play any role in the organization of the Universe or in the development of life.

We can observe a random phenomenon, not chance:

$$RANDOM \text{ PHENOMENON (observable)} \Rightarrow CHANCE \text{ (not observable)}$$

Ex: We see the dice, but we don't see chance.

Ex: A biologist can observe the random organization of a genome, but he is able to observe chance as such. Life does not result from a miracle, but from a complex form of bio-chemical organization of matter and energy; this organization took place in a favorable environment, including water, carbon, nitrogen,

calcium, phosphorus, etc.; with a great tolerance in regard with temperature, atmospheric pressure, gravity, and thanks to a non zero energy density of the Universe. Animal thought and human thought are produced by matter and energy which are organized through complex networks.

Seventh conclusion: Chance is not a phenomenon. This concept does not lead the development of life.

The Anthropic Principle

A priori, the word principle is suspect, because it postulates that the anthropic principle is an apodictic (de jure and de facto) certainty.

Whatever it may be, this expression raises two pressing questions :

- a. How the Universe would be if one of fundamental constants were otherwise ?
- b. Would mankind exist, if the value of one of fundamental constants were a little different of what it is?

The statement of the anthropic principle accumulates formal defects. Contrary to what is alleged :

- c. The fundamental constants don't pre-exist in the Universe.
- d. No constant has an exact value : the value of constants is approximate and scalable, except decision of CGPM.
- e. The constants are concepts which don't have any active role on physical state of the Universe.

One could also ask how would be the world if natural color of water was red. Such a fiction is obviously deprived of scientific interest. In philosophy, such a reasoning is a sophism.

If the Universe was different, some of the constants would probably be different; the opposite formulation is false.

A Wishful Thinking

The existence of reality as such is not conditioned to the existence of Man. The Universe has long existed without Man, and it will continue to exist when the last human is deleted from the planet ; what will no doubt be celebrated by the other species with a great relief. Human life takes place inside a short parenthesis inside the evolution of the Universe ; a parenthesis which seems to be a dismal failure, but some prodromes warn about the coming end of this parenthesis. The ecological imbalance, mainly caused by the demographic invasion of the planet and asystematic destruction of nature, makes human being seriously threatened. The greatest predator, which is also his own predator as he practices full-scale self-predation, has for gotten the warning of Spinoza 1632-1677 in *The Ethics* 1677 : Man is a part of nature. The anthropic principle is rooted in the Aristotelian finalism (Aristotle 384-322). It is led by the desire of considering Man the ultimate outcome at the center of the Universe. In *The Art of Loving*, the Latin poet Ovid (43 BC-18 AD) already observed : One believes easily what one desires (Book III). The anthropic principle is also an attempt for giving a scientific support to a wishful thinking which is deprived of science. Ultimately, this principle is an anthropocentric fiction of metaphysics, which postulates a teleonomy of the Universe towards its supposed ultimate form : the human species.

References

1. *The Invention of Time & Space* (2017).



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