P = NP ... P ≠ NP which reality ?

or “critique of a conjecture”

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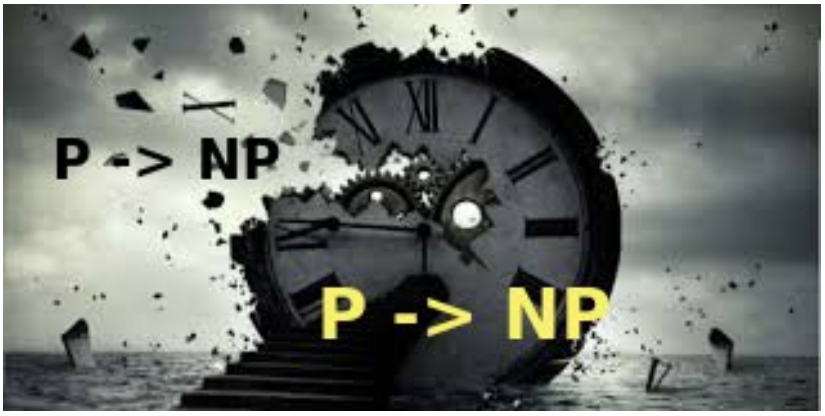

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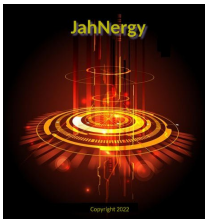

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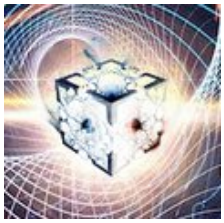

P = NP ... P ≠ NP wich reality ?

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Item information

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Summary

The problem "P $\stackrel{?}{=}$ NP" is a conjecture in mathematics, particularly in theoretical computer science. It is considered by many researchers as one of the most important conjectures in the field, and even in mathematics in general.

So the Clay Institute of Mathematics, and that's not too little, has listed this problem in its list of seven millennium prize problems. This same institute is offering a million dollars to anyone who can demonstrate P = NP or P ≠ NP or demonstrate that it is not demonstrable.

It is this last point that I propose to discuss and submit to your reading by developing the idea "P = NP ... P ≠ NP what reality?". As such, this publication does not include any mathematical development, beyond the mentions of reduced expressions, it is therefore accessible to all.

Good reading !

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First of all, what is the conjecture "P = NP ... P ≠ NP"?

A definition often given and accepted:

"What we can find quickly when we are lucky, can it be found just as quickly by intelligent calculation? or "Can intelligence replace luck?"

Or according to another definition:

"Anything that can be checked easily, can it be discovered easily?"

Let's give an informal example:

A crossword grid in square format is made up of "n" squares per side, the total number of its squares is therefore "n^2", some squares are blackened randomly according to the classic system of a grid. Besides that a finite list of words is provided. The question asked is: "Can we find an algorithm using the grid and the list of words provided, in such a way that it can propose a solution in a shorter time than chance would allow?"

This example introduces the notion of ''polynomial time'', namely how much of a complex polynomial type problem, such as that posed by ''P = NP'', an intelligence or a computer algorithm can analyze and solve, in a fixed time as short as possible, usually on the order of a second? This results in a definition of "P" and "NP" relating to polynomial time:

1/ A problem is in the class "P" if there is an algorithm to solve it in polynomial time

2/ a problem is in the class "NP" if there is an algorithm to verify that a given solution is suitable in polynomial time.

For the moment and by using the methods calling on the predictive logic with two valences, it has not been possible to demonstrate the conjecture ''P = NP ... P ≠ NP'', just as it is not has not yet been found, a stronger tool capable of solving it, as well as it has not been considered that this conjecture is a problem more rhetorical than mathematical, we will examine this in the present study.

The P-class

''P'' means ''Polynomial'', this class of problems is known to be able to be solved efficiently by polynomial algorithms, but it is shown that non-polynomial algorithms are also efficient, but for limited classes of data. This class is defined as being independent of the technology itself, it is also stable in the sense that it remains polynomial in the operations carried out from polynomial sources (compound, complexity), this point will also be mentioned.

The class ''P'' is made up of languages recognized by machines using polynomial algorithms (1)

Systemic:

The system used so far to solve in the class ''P'' uses predictive logic with two valences (2) whose congruences (0 and 1) are congruences reduced to a polynomial algorithm that can be written as follows :

“Let (Σ) be a predicate whose argument is denoted (ξ) constituting the causal object or logical group, associated with a polynomial algorithm (H), the relation between (Σ) and (H) can be written:

$(\xi \in \boldsymbol{H} \underset{\Delta}{\Leftrightarrow} \boldsymbol{\Sigma}\ (\xi) = \mathbf{1})$ <=> $\boldsymbol{\Sigma}$ *is true* More generally $\boldsymbol{H} = \{ \xi \mid \boldsymbol{\Sigma}\ (\xi) \}$

We will come back to the choice of the system when we come to the chapter “What reality?”.

The NP class

''NP'' stands for ''No-deterministic Polynomial'', this class is a subgroup of the ''P'' class, its particularity is linked to connectors with permistance (3), i.e. to authorize choices of 'non-deterministic problems by the polynomial algorithm. However, being a subgroup of the class ''P'', the class ''NP'' has its properties, the problem then encountered by the algorithms using the predictive logic with two valences, comes up against impossible facts, '' P being by nature deterministic.

This problem is currently posed by workaround using a "decision tree" or "decision problems". This decision problem has inputs (causal object or instances) and a question about the input whose answer is “Yes” or “No”.

To do this, the non-deterministic algorithm calculates in each branch of the tree for an argument (ξ) whether the output should be ''0 or 1''. The outcome (factual) is conditioned by all the answers, the algorithm gives as outcome ''1'', if at least one branch allows $(\xi) = \mathbf{1}$. If all the branches have as answers ''0' ', then the algorithm does not allow ''1'' as an outcome.

The fundamental problem posed by the conjecture “P = NP ... P ≠ NP” resides precisely on the point that has just been assumed. Will we be able to find, or not, an algorithm capable in polynomial time of solving the classes of polynomial problems? It is already noted that by using the predictive logic with two valences, it is for the moment is impossible to answer in almost all the cases with the conjecture and that when the logical group has at least a large or very large decision branch, it the term “principle of worse” is used.

Using binary logic tools or other methods, there is no general solution in 2023 solving the conjecture “P = NP ... P ≠ NP”.

This brings us to the question that is the subject of this study.

Questioning

The question then arises as to whether the use of the tool using implicit tetravalent formal logic can provide a satisfactory answer to the following questions:

1/ Is the conjecture ''P = NP ... P ≠ NP'' a math or a view of the mind linked to an unrealizable temporal need (notion of speed of execution)?

2/ Is the conjecture "P = NP ... P ≠ NP" demonstrable?

3/ If it is neither provable nor unprovable, does the conjecture "P = NP ... P ≠ NP" make sense? If it makes sense, in what frame of reference?

Before attempting to answer these questions, it is useful to define which analysis tool will be designated for this purpose.

This study is part of the “Tetravalent logic and cybernetics” cycle, so it is mainly the tetravalent formal logic analysis tool “JahNergy ©” that will be discussed. For the record or for acquaintance, this tool is developed in the treatise on tetravalent formal logic presented by Mrs. Célia-Violaine Bouchard (4).

1/ Is the conjecture "P = NP ... P ≠ NP" a mathematics or a view of the mind linked to an unrealizable temporal need (speed of execution)?

Is she a mathematics ?

If we stick to the strict formulation, the conjecture ''P = NP ... P ≠ NP'' has all the characteristics of a mathematics, in the sense that its writing is in polynomial form and therefore can be treated as such. However, the notion of mathematics has several aspects. Consider two.

1/ In the sense of abstraction, the conjecture “P = NP ... P ≠ NP” is a mathematics since behind each variable an infinity of values can be proposed satisfying the equality. However, in the construct that interests us, “P” and “NP” represent much more than values, namely complex classes composed of variables and propositions.

2/ In the real sense, whether it is composed of rational or irrational, the question that arises is whether the propositional part of the classes is a mathematics in the conjectural relation. However, even if the conjecture is mathematizable, this does not mean that it has a physical meaning, or more simply that it finds a general solution or a general algorithm, therefore that it is the support of a satisfactory application.

Is she an unattainable temporal need?

If the conjecture does not find a satisfactory application, the question should be asked, is it a figment of the mind linked to an unrealizable temporal need?

To begin by answering this last question without having answered the question "is it a mathematics?" is within the realm of the possible, it is however necessary to define the model or cosmological postulate in which one places oneself.

In the standard model, the reference frame is that of a 3-dimensional space (vector subspaces) in which time is considered as an additional dimension. Of course there is no question here of revisiting the clichés of the standard model, for our study we will use the entropo-neguentropic polymorphic cosmological model developed as a postulate by Mrs. Célia-Violaine Bouchard, under the name ''JahNergy Cosmologic Model '' (JCM).

Here's the gist:

The particularity of the JahNergy model is based on a proposition affirming that the Universe is governed by a space-energy relationship, time not being taken into account, it is described there as an abstract value.

In this model, the general architecture of the universe is the result of the association of the two cosmological facts. Each factual is provided with a set of properties or causes, which is specific to them and put in relation thanks to vectors carrying out the associative entanglement.

The first cosmological factual is that related to space, polymorphic it is composed of a set of vector spaces establishing the "fine structure" or vector frames.

The second factual is linked to the transformations and changes of state of which the quanta are the target.

Associative entanglement is achieved by the gravitational tensor (6), whose mediator is the graviton. This tensor has the effect of bending each vector space according to the degree of polymorphism with which it is associated. We will call “hadronic evolution space” or “HES”, the vector frame (7) which is familiar to us or our. If the graviton had this unique property, this would not allow it to achieve associative entanglement, indeed the curvature of space does not in itself justify the interaction between the masses (8). For associative entanglement to be achieved, the graviton must interact by coupling with the forces of nuclear cohesion or gravito-nuclear coupling or gravito-gluonic coupling.

This coupling is made possible by the mediation of the graviton on the quanta, because it induces changes of quantum states. These same changes of state realize the second factual, the coupling between the two factuals realizes the associative entanglement.

The nature of the associative entanglement in the context of the gravito-nuclear coupling (9) is composed of two states, the entropic transformations and the negentropic transformations, these are responsible for the entropo-negentropic equilibrium of the vector subspaces cosmic.

This means that for each entropic transformation involving a change of state from a cause (causal) to an effect (factual), a negentropic transformation is achieved by reversion from an effect to a cause. In this mechanism space is not a limiting factor. Each type of transformation evolves in its own vector subspace, there is no interference.

Movement, whatever it is, is the result of an entropo-kinetic transformation.

Consequences :

1/ Any real object in motion is as a consequence of a change of state in an entropo-negentropic mechanism.

2/ Cosmological time is an abstract value.

Simple example:

Two cars "x" and "y" move from point A to point B in our space of evolution, A and B are separated by "z" kilometers. The car (x) arrives first at point B, it has not taken less time, in fact it has spent more energy than the car (y) which is then between point A and B. More simply the car (x) spent more energy on the vector AB, to arrive first. We can therefore express here the speed of (x) and (y), not in kilometers per hour, but in energy expended per kilometer.

This is true in practice every day: I have to travel 100 km to make a road trip, I have the choice between taking the highway or a secondary road. On the highway I drive at the mechanical space-time correspondence of 130 $km.h^{-1}$, on the secondary road 80 $km.h^{-1}$. In the first case I will arrive at my place of work having burned more gasoline, therefore more energy, than if I take the secondary road. In an abstract way (reduced to a mechanical time, that of a clock synchronous with the rotation of the Earth on its axis), it will take me less mechanical time going through the highway, but in reality it will be the consequence of greater energy expenditure over a distance, ''m'' liters of gasoline per 100 km.

In this case, if we consider that the Universe is governed by a mechanics of the space-energy type, is the conjecture "P = NP ... P ≠ NP" demonstrable, undemonstrable ?

Let us return to the accepted definitions of the problem posed by the conjecture:

"What we can find quickly when we are lucky, can it be found just as quickly by intelligent calculation? or "Can intelligence replace luck ?"

Or a simpler definition:

"Anything that can be checked easily, can it be discovered easily ?"

We have also seen that The fundamental problem posed by the conjecture ''P = NP ... P ≠ NP'' resides precisely on the point which is: '' Can we find or not, an algorithm capable in polynomial time to solve classes of polynomial problems? ''.

1/ Expected resolution taking into account cosmological time:

The first definition is placed in this context. Let's start by discussing the use of the word "luck". The term chance is used here in the mathematical sense, in this sense it constitutes a violation of the statistical principle which states that any effect produced by a cause has a degree of probability of occurring, this degree being between 0^+ and 1^- , in other words between weak and strong, the chance as for it, allows that a cause produces the expected effect with a probability of 1 ie 100%.

The same definition links this probability of occurring to a polynomial “time”. This polynomial time is itself associated with the same probability as luck, it must be very short, hence the use of the term “rapidly”. However, we have previously highlighted by contradiction that cosmological time is an abstract value. In this, cosmological time cannot in any way be involved in entropo-kinetic transformations, nor can terrestrial mechanical time which is a practical view for measuring all the kinetics in our local frame of reference.

In the acceptance of this observation, the conjecture “P = NP ... P ≠ NP” cannot be demonstrated or unprovable with the use of cosmological time in the formulation (10). It follows that this method will not succeed in solving the conjecture.

2/ Expected resolution taking into account associative entanglement:

In this context, the second definition seems to be a better candidate than the first, because it focuses on a notion whose temporal characteristic is much less marked, being made here use of the term "easily", which associates it with a spatial dimension. , being comfortable is often synonymous with being able to move easily in your living space.

We have seen that associative entanglement relates the kinetics of quanta to a space-energy defined in an evolution space referring, as far as our frame of reference is concerned, to the hadronic evolution space (HES).

From a rhetorical point of view, what has just been written means that in the conjecture ''P = NP ... P ≠ NP'', the goal would not be to find out whether it is provable or unprovable, but if it is existential, or more simply to say does it have a meaning, and if so find the tool, which would then be of a non-algorithmic, but logical nature.

In this case it would be necessary to find a quantum tool, itself associated with an adapted logic development, which by improving its technical performance would allow the resolution of a polynomial problem of the type '' P = NP '' quantitatively important using as little energy as possible (11).

The use of tetravalent formal logic will make it possible to answer this question (12).

Conclusion

In a frame of reference realizing associative entanglement, the conjecture ''P = NP ... P ≠ NP'' can neither be demonstrated nor unprovable because it only makes sense if it is associated with facts relating the space to entropo-negentropic transformations and not to a relationship of the cosmological space-time type.

The development of computer tools using quantum intelligence that can process, in a quaternary mode, the need to solve complex polynomial problems with as little energy as possible, is a way that opens up interesting perspectives on the reality and relevance of the ''P = NP'' conjecture as well as advanced applications in the field of computer science and artificial intelligence.

With my grateful thanks.

Célia-Violaine Bouchard

References

(1) The best-known system in the history of polynomial algorithms is the Turing machine, named after its inventor, mathematician Alan Mathison Turing, founder of the foundations of computer science.

(2) Treatise on tetravalent formal logic by Célia-Violaine Bouchard, § 3 .

(3) Treatise on tetravalent formal logic by Célia-Violaine Bouchard, § 4.1.1

(4) Available on Mrs. Célia-Violaine Bouchard's publication fund in the mathematics section at https://cvi-bouchard.net

(5) The development of this model is currently available in abstract form, contact the author.

(6) Not to be confused with the tensor of order 2 as defined in Einstein's model and which does not fully account for gravitational couplings.

(7) By abuse of “three-dimensional” language.

(8) This point constitutes the limitation of the model of general relativity proposed by Einstein.

(9) The graviton also couples with the other gauge bosons, the photon in the case of electro-gravity coupling, the W and Z bosons in the case of beta-gravity coupling.

(10) i.e. using the classical equations defining the velocity in the H.E.S. such as :

$$\vec{v} = \frac{\mathrm{d}\vec{r}}{\mathrm{d}t} = \begin{pmatrix} \frac{\mathrm{d}x}{\mathrm{d}t} \\ \frac{\mathrm{d}y}{\mathrm{d}t} \\ \frac{\mathrm{d}z}{\mathrm{d}t} \end{pmatrix}.$$

(11) Endomorphic yield, the general wording is:

$$\frac{\textit{Volume of information processed}}{\textit{Energy expended}}$$

(12) The mathematical development will be proposed later in another publication of the same series “Formal tetravalent logic and cybernetic”.