



Feature Article

## The 'Consciousness-Brain' relationship

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**Abstract.** From a thought experiment on the observation of a human intellect by itself, we will attempt to demonstrate that, unlike what many neuroscientists postulate, assemblies of neurons do not generate consciousness: Consciousness pre-exists any material system.

**Keywords.** Consciousness, meaning, information, activity, neurons.

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### INTRODUCTION

Understanding that the nature of consciousness is a real challenge for Western cultures which heavily focus on the scientific method for understanding natural phenomena, one usually refers in this case to the “hard problem”.<sup>1</sup>

By contrast, Eastern cultures traditionally adopt philosophical approaches to the problem, such as Hinduism<sup>2</sup> or Buddhism<sup>3</sup>, with a notable Western exception (Eckhart Tolle).<sup>4</sup>

In a nutshell, three main visions are fighting each other over tackling the “hard problem” from the Western side.<sup>5</sup>

A first position is *physicalism*, a kind of monism stating that physical laws are perfectly valid for explaining the existence of both mind and body. Such a vision (Thales, Leucippus, Democritus, Epicurus) is a broader version of materialism taking for granted that there exists in the universe, in addition to matter, energetic phenomena such as electromagnetism, that are physical and real. In this view, physical states (size, mass, shape, energy, etc.) and mental states (beliefs, desire, emotions, etc.) are made of the same “stuff”.

A second position is *dualism* (Plato, Descartes), stating that mental and physical states are both real and made of two different materials that cannot be assimilated to one another.

Finally, a third position is *illusionism*, stating that consciousness simply does not exist and involves some sort of introspective illusion. According to D.J. Chalmers, this illusion is a close relative to the meta-problem of consciousness, i.e. the problem of explaining why we think that there is a problem of consciousness. In fact, illusionism states that distinguishing between

easy problems and the hard problem distracts our attention from the hard question which is: “And then what happens?”<sup>6-8</sup>

In contrast with the above approaches, we would like to draw your attention to an Einstein’s remark made in the context of “how to deal with the threat of the atom bomb”:

*“A new type of thinking is essential if mankind is to survive and move toward higher levels.”*<sup>9</sup>

Owing to the generality of this statement, such a remark has been widely diffused out of its context in several versions, among which we shall retain this one:

*“No problem can be solved from the level of consciousness that created it”.*

Such a formulation is quite reminiscent of Gödel’s incompleteness theorems.<sup>10</sup> Applied to the ‘hard problem’ or the ‘hard question’ of consciousness, it means that the bottom-up logic, typical of western thinking, in which consciousness is the result of long-range coherence in neural activity<sup>11</sup>, may be considered as a dead-end. If a theoretical model has recently been proposed for decoding brain wave information,<sup>12</sup> it remains that it does not address subtle aspects of consciousness.

It is thus our deep conviction that a “new” approach (as far as Western minds are concerned) is to consider a top-down logical process inspired by Eastern thinking where consciousness pre-exists any material system such as neurons or brain.

In other words, we plan to demonstrate that consciousness cannot be an emergent property of neural activity. Owing to the importance of such an assertion for Western minds, the demonstration proposed in this paper is concise and readable by non-scientists. A more technical and scientific demonstration is published as a separate paper showing how this top-down approach fits into current scientific knowledge.<sup>13</sup>

## DEFINITIONS

Our aim in this paper is to give a wide audience access to the concise demonstration of the logical necessity to consider consciousness as the source of reality. The presentation has thus necessarily many gaps that will be addressed in a forthcoming article.

Among the gaps, the very first one is a *good definition of consciousness*. We sincerely think that the best way of handling the consciousness concept is to assign it an “identity card” in order to recognize it by its manifestations in space and time.<sup>14</sup> On this ground, we state that consciousness is the tool that allows us to find a meaning in information, either analyzed by intelligence or

coming directly from feelings and intuition (qualia). It *a priori* applies to most living beings.

Our demonstration below thus necessarily implies the existence of two other dimensions (one space-like, the other one time-like) located outside a 4D space-time framework.<sup>15</sup> With such two extra-dimensions, consciousness would acquire an extra-human value and it would then be designated by Consciousness. It has as real (probably more real) features than our so-called “objectivity” attached to our manifest 4-D space-time horizon. We will assume that the extra time dimension is the ordering element that generates different attributes within itself as illusions<sup>16</sup> as developed elsewhere<sup>13</sup>.

Our line of thought in this matter is inspired by chemistry, a science where thermodynamics uses static general concepts putting constraints on dynamical aspects, which allows selecting among all possible paths the most favorable to evolution. Consequently, we shall now focus on the framework rather than on what may happen within the framework, a problem which will be addressed later.<sup>13</sup> Concerning dynamics, we will be considering time as an emanation of consciousness, the question of its topology (linear, curved or fractal) being thus irrelevant to our demonstration.

Similarly, we have introduced the concept of **activity**, which is generally used in thermodynamics to combine energy and entropy within a single entity. We therefore recommend reading “energy/entropy” whenever you come across the word “activity”, unless you are familiar with thermodynamics.<sup>17</sup> And if you are reluctant to the concept of entropy, just think “energy”. It is close enough to make laypeople understand the idea.

## SCIENTIFIC BASES, POSTULATE

To demonstrate the priority of consciousness over neurons, we will use principles of computer science,<sup>18,19</sup> information theory,<sup>20</sup> Gödel’s incompleteness theorems<sup>10</sup> and the laws of thermodynamics.<sup>17</sup>

And we will refer to the following postulate: ***any phenomenon preexisting another one is able to participate in the creation of the latter, whereas the contrary is impossible.***

This postulate, which conditions the possibility to create a principle from another one, should clearly explain how a space-time-matter framework used by conventional science is able to emerge from a non-local Consciousness following a hierarchical cascade, hereafter named “the thought experiment”, where a person observes the functioning of his/her own intellect.

## CONTEXT AND DESCRIPTION OF THE THOUGHT EXPERIMENT

The thought experiment that we will propose relates to what is called in psychology: metacognition. Some evolutionary psychologists hypothesize that humans use metacognition as a survival tool, which would make metacognition the same across cultures. Writings on metacognition date back as far as two works by the Greek philosopher Aristotle (384-322 BC): "*On the Soul*"<sup>21</sup> and the "*Parva Naturalia*".<sup>22</sup> Today, metacognition is studied in the domain of artificial intelligence and modelling. Therefore, it is the main domain of interest of emergent systemics.

In such an experiment, the Subject and the Object are the same since the person observes his/her intellect by means of the latter. Although all the parameters of the Subject and the Object are identical, they operate in the self-observation process at different chronological and hierarchical levels. The result is that the situation can be summarized by the relationship between five protagonists: **consciousness, meaning, information, activity and neurons**.

Organized in couples, their specific relationship allows for the proper functioning of the whole:

- **Consciousness and meaning,**
- **Meaning and information,**
- **Information and activity,**
- **Activity and neurons.**

### *Consciousness-meaning*

The intellect is a system comprising, by analogy with a computer<sup>23</sup>, a *hardware* (material device) and several types of *software* (immaterial devices). The difference with a computer is that the physical entity is able to repair itself by creating *de novo* material components (cells) necessary to its proper functioning.

In the software-hardware couple composing a computer, hardware without software would only be a set of 'dumb' electronic circuits: central unit, memories, I/O interfaces, peripherals. Even if Artificial Intelligence equipped computers are able to write software, to self-educate and self-duplicate themselves, even to self-improve their level of performance, they have initially been fitted with software designed by conscious beings, without which they would be unable to operate.

Moreover, electronic components are designed and manufactured by conscious beings, not by the computers themselves using 3D-printers for instance, owing to difficulties in implementing evolutionary processes and to the "salt contingency problem" raised by Alex Ellery in 2017.<sup>24</sup>

In a computer, *since software gives life to hardware, it has a functional anteriority over hardware*.

Now, in a computer, the process of cognition and memorization is based on the manipulation of binary digits, the so-called "bits" (with just two possible values 0 and 1), a succession of such bits being called "information". An important aspect is that, at computer level, such information has no meaning, even if bits are combined and manipulated according to logical rules inferred from the existence of consciousness. Meaning only appears as soon as information is combined with consciousness.<sup>25</sup>

***Thus, it is consciousness that gives a meaning to information, and thereby possesses a functional anteriority over meaning.***

### *Meaning-information*

The way consciousness gives meaning to information is by considering pieces of information which, once compared to memorized other pieces of information, are placed in a context which gives them a meaning.

We typically find ourselves in the framework of the information theory, where *meaning is defined as information in a context*.<sup>26</sup> Although of a similar nature to the point to be often confused in everyday's language, information and meaning are not identical.

At the end of his life, the great physicist John Wheeler considered that, in the universe, all could be made of information.<sup>27</sup> In our thought experiment this basically means that, within a field of information, consciousness has the ability to select pools of information of varying sizes thus defining "objects" or "things" that could be differentiated by their respective information content. Obviously, as evidenced by the fluidity of thought, such pools of information should not be considered as static entities, but rather as dynamic systems exchanging information.

***Since it is the meaning that gives its value to a given amount of information it chronologically anteriorizes information and is, therefore, hierarchically superior to it.***

### *Information-activity*

Based on the above considerations, it follows that, in our thought experiment, characterizing pools of information solely by their number of bits is not enough. One may assume that within a given pool of information, some groups of bits that are considered by consciousness as having a high meaning will not be easily transferred

to another pool of information, since such groups of bits give an identity to the information pool. Thus, transferring them, would inevitably make the pool lose its identity. Here appears, in a logical way, the **conscious “I”** which holds a number of bits sufficient to give itself an identity within the whole information field.

This means that besides the information content, one should also introduce an information **availability** that could be low or high depending on its importance for the definition of the identity of the pool. As soon as two pools have not the same information availability, information is expected to flow from the pool having the higher availability towards the pool having the lower availability. By such information transfers, the information availability of the emitter decreases, whereas the information ability of the receiver increases, allowing pools of information to undergo evolution on two levels. At a first level, pools may just change their information content by exchanging non-meaningful bits that are readily available. At a second level, pools may also change their identity by exchanging meaningful bits that are not readily available.

It suggests introducing a new concept, **information activity**, defined as *the product of information content by information availability*.<sup>13</sup> Consequently, one may meet pools having small information content that are not readily available, corresponding to a low activity pool. Conversely, pools characterized by high information content that is readily available for information transfers would be qualified as high activity pools. Such a definition of information activity has also the consequence to make duality appear within a non-dual information field. Accordingly, a given activity value may be associated either to a low information availability within a large pool of information or to a highly available information coming from a small pool of information. In the first case, activity may be associated to “moving” information allowing evolution and change in “time”, while in the second case it becomes associated to “structural” information defining conservation and identity in “space”. A space-time frame thus emerges quite naturally by the action of consciousness giving meaning to various pools of the information field.

From this analysis, it follows that **information is unique in the information field, whereas activity characterizing the intensity of information transfers has a dual character** responsible for an *energy/entropy duality* in the physical world.

Such a duality is reflected by the existence of two universal constants:

- Boltzmann’s constant  $k_B$  ruling the minimum information content viewed as an entropy (statistical physics)

- Planck’s constant  $h$  ruling the minimum information activity for observing an energy change viewed as a frequency (quantum physics) or as a temperature (thermodynamics).

**Consequently, one can assert that information chronologically anteriorizes activity, and is therefore, hierarchically superior to it.**

#### Activity-neurons

Having given birth to concepts of entropy  $S$  and energy  $W$  through the concept of vibration  $f$  ( $W = h \cdot f$ ) and temperature  $T$  ( $W = k_B \cdot T$ ), it remains introducing the “matter” concept through a third universal constant intimately associating space to time. The reason for it clearly stems from the fact that it is the same consciousness acting on a unique information field that creates time as moving information, and space as structural information. The two concepts referring to the same amount of information should thus necessarily be linked as two different viewpoints about the same parameter depending on information availability. The basic postulate of equivalence between space and time stemming from the theory of relativity, another most important physical theory in science, is thus logically introduced.

By this definition, the third universal constant should be a **speed  $c$**  imposing an upper limit to the transfer of moving structural information between information pools.

From the above considerations, it follows that *two kinds of elements should exist in a physical universe*: those able to propagate with the *maximum allowed speed  $c$* , known as “photons”, and those that propagate at *speeds  $v < c$* , known as “matter”. In the second case, one may assign to a material object with an energy  $E$ , an inertial coefficient  $m$  or “mass”, linked to it by  $m = E/c^2$ .

Adding the two other universal constants, we may write *the fundamental identity of our physical world*:

$$E = m \cdot c^2 = h \cdot f = k_B \cdot T,$$

meaning that our reality is made of a combination of *inertia (mass  $m$ )*, *spontaneous vibration (frequency  $f$ )* and *spontaneous movement (temperature  $T$ )*.

Going back to our computer analogy, it should now be clear that neurons are likened to hardware since they are the cells dedicated to information processing. Each neuron is an information-processing unit linked to other neurons to form a network with various crucial physical nodes at the levels of brain, heart and intestines. The nodes of the network are linked together to form an **intranet-like physical body** which behaves in an

autonomous way and can be likened to a set of circuits: network nodes (brain, heart, intestines), Input interfaces (the five senses plus a sixth one relaying feelings and intuitions), Output interfaces (limbs, voice, ...), associated to neuronal, and possibly non-local, memories. The physiological complexity of the whole allows it to perform processing functions, but not interpretations.

In a nutshell, even if the **intranet-body** possesses a certain processing autonomy, the directions of its actions are given, at each stage of the process, by the meaning of the intermediate results interpreted by our **consciousness**.

It then appears that neurons, which are in the physical world the material interface for manipulating information, are located at the very end of the hierarchy described in our thought experiment.

This analysis shows that **activity plays a role chronologically anterior hence hierarchically superior to the one of matter, making it impossible to state that consciousness emerges from the physical activity of neurons. It is the opposite.**

#### SYNTHESIS:

**We have hereby demonstrated that consciousness anteriorizes meaning, which anteriorizes information, which anteriorizes activity, which anteriorizes neurons.**

Consequently, the relationship between consciousness acting on a unique information field, and brain acting in a four-dimensional space-time, acquires in this environment the status of a law:

**LAW:**

**Consciousness preexists neurons and cannot be an emergent property of them.**

We shall deduct from it 5 corollaries, some of them remaining to be confirmed.

**Corollary 1: Consciousness exists independently from the neurons.**

**Corollary 2: Matter originates in consciousness (spirit).**

We posit that consciousness preexists not only neurons but matter in general. By likening consciousness to spirit, one could, subject to further confirmation, deduct that matter originates in spirit.

**Corollary 3: Extension to non-local consciousness:**

Subject to similar confirmation, matter, activity, information, meaning and consciousness would be states of decreasing vibratory levels of a same principle, **the ground state of which would be pure Consciousness**, and the forms closer to this fundamental level would be subtler or less material.

We might then postulate that this fundamental state being without precursor, it would be at the origin of all that exists. There may then be a high probability that the Primordial Consciousness be located outside space-time, since being at the origin of it, it could hardly belong to it (Gödel's theorem).

This Primordial Consciousness could be named **Non-local Consciousness**.

**Corollary 4: Generalization**

- Non-local Consciousness would preexist all that exists in the observable universe or *manifest world*.
- Its expressions would be of a decreasing level when *coherence diminishes*: meaning, information, activity, and finally inert matter.
- They would be of an increasing level when *coherence grows*: structured matter (crystals), unconscious life, life conscious of the world, then of itself, and, at last, of the fact to be conscious of being conscious, this most advanced state being the one of Humanity.

By analogy with the **geometrical fractalisation**, this cascade of levels could be named **conceptual fractalisation**.

**Corollary 5: Practical consequences**

In our thought experiment, the energy considered is a mix of chemical energy, well known by biologists (mass  $m$  and temperature  $T$ ), and of electromagnetic energy (frequency  $f$ ), tolerated by them. Since these energies are the ones concerning the object-oriented language, as defined in our companion paper,<sup>13</sup> nothing prevents from having more subtle energies working at the meta-language level, such as vital energy or Psi energy, largely ignored by mainstream neuroscientists. Using the brain computer metaphor, it may be time to update our own software.<sup>28</sup>

By contrast, traditional medicines commonly use these energies and the '*informational function*' of consciousness to cure patients, with track records of several millennia.

This contradiction is the main subject of interest of the experiments, underway or in project, by the N-LIGHT Research Institute, its members and its partners.

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