

The Mystery of Time

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ABSTRACT

The purpose of this paper is to focus the question of time from the Transcursive Logic (Salatino, 2017). Investigating time from subjectivity does not aim to determine what is time, but rather, to show why this is something we will never know. Based on a thorough investigation of the neurophysiology of the central nervous system, it shows where the management of psychic or internal time resides and its relationship with external or chronological time. The concept of 'temporary wedge' is developed, which is where, according to a theory developed in 2009, the noble processes of the psychic apparatus are carried out. Finally, empirical evidence of this temporal mechanism is offered.

Keywords: subjective reality, chronological time, psychic time, temporal wedge, transcursive logic.

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1.0 INTRODUCTION

There are at least three ways to characterize time. 1) Through the classical mechanical concept that considers that time is not related to any structure and corresponds to displacements in space. 2) Through the thermodynamic theory that is associated with entropy, and 3) From the biological concept that is linked to evolution. None of the three, by itself, is enough to interpret time. (Eisler, 2003) Moreover, the three together, either. As humans, we can only have access to our intimate experience and our thoughts, the only aspects that can help to qualify 'our time.'

Because of the above, approaching the issue of time from Transcursive Logic (TL) is not intended to determine what is time, but rather, to demonstrate why that is something we will never know. This ignorance arises because neither space nor energy nor evolution can avoid in its development, respect the irreversibility of chronological time or appearance. This is because classical science and the logic that sustains it, although they establish the possibility that physical processes are reversible, today confirms in part the linear nature of time and the world. That is, the universe had a beginning and evolves irreversibly towards an announced end. A conception, on the other hand, inherited from the Judeo-Christian tradition.

However, for the Hindus, the Greeks, the Chinese, the Maya, and the Aztecs, time was cyclical. Even for the ancient Hebrews, who, also, adopted a position against the 'flow' of time, the

reverse of what the later Judeo-Christian tradition proposed. This is, with "the face towards the past" and leaving the future behind, something that is absolutely reflected in their language since they used a term that literally means "to our face" to refer to the past, and one that literally refers to "what is behind", to allude to the future (Verdu, 2015).

We already have the three elements that we will integrate to try to reveal the mystery that makes time something inscrutable: 1) an irreversible flow from a before to an after, 2) a cyclical becoming that relates the present, the past and the future, and 3) a 'turn your back on the future'; something we could synthesize in the expression: "what was is what will be."

To achieve the proposed integration, we must admit the existence of two times: a linear, irreversible and apparent one that we will call chronological; and another cyclic, reversible and hidden that we will call psychic or internal. To apply the principles of TL, we must identify in each of them the fundamental aspects that characterize it, and then establish what they have in common; that is, what binds one another.

It is easy to realize that the panorama we are considering has nothing to do with what physics proposes, both classical and relativistic since we are going to address the problem of time from within the observer subject. However, we will abuse some developments in the theory of relativity to better understand the proposal.

We are not going to talk, however, about the reduction what does it mean absolute time (void) of Newtonian physics; we only adhere, subtly as we have already said, to the Einsteinian space-time of special relativity to explain later the definite existence of a relative simultaneity.

We want to say that we will analyze the problem of time from the point of view of the subject, from his individuality, from his central nervous system (CNS) and we will try to show how this connects, unfailingly, with the surrounding reality.

2.0 THE CHRONOBIOSPHERE

Jakob Von Uexküll said, referring to the naturalist observer:

"... he can only investigate what enters through his senses, and he knows very well that no experience can ever reveal other sensations than his own." (Von Uexküll 1945, p. 66).

An assertion that we could extend it to any living being, and not restrict it only to the human being.

The same brilliant biologist, zoologist, and German philosopher elaborated in 1909-1910 a fundamental concept: the idea of the 'immediate environment' (Umwelt, Uexküll, 1909, p. 117) (see Appendix) as a subjective world, where, the subject and environment form a functional unit. We will take, in part, this characterization as a guide to frame subjectivity, of course, stripped of the Kantian teleological effluvia on which it bases an alleged "plan" to follow.

The subjective biology of Uexküll is functional for our purposes, insofar as it represents a kind of intrasubjective development of the phenomenology of life, which allows us to understand living processes as a way of communication between the outside world and the inner world of the subject.

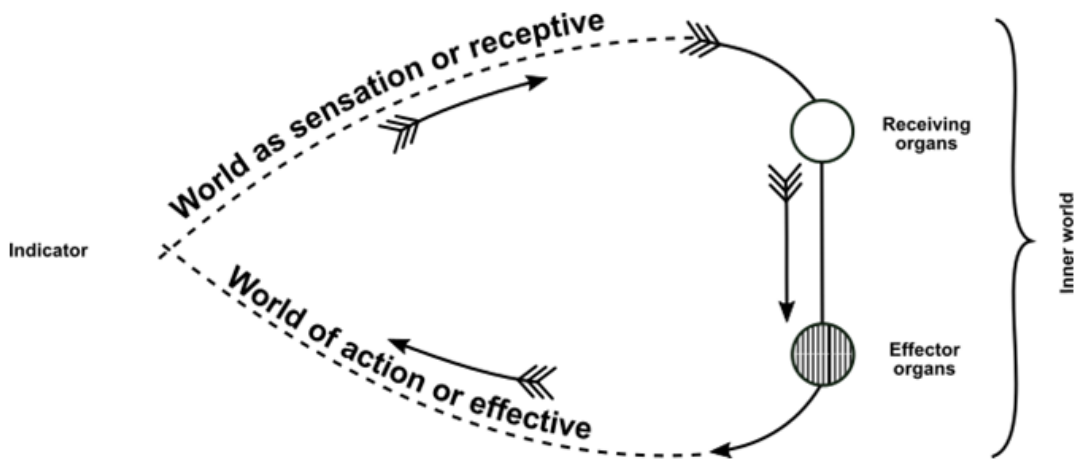
"Experience implies a subject that makes it and an object on which it is made"
(Uexküll, 1945a, p. 11).

"The study of objects and their relations with the subject is the first foundation of true knowledge of nature." (Uexküll, 1945b, p. 130).

We see how he circumscribes his observation to the subject/object pair trying to record the subjective/objective co-presence in the interrelations of the living being with its surroundings, in total agreement with the TL.

The way that Uexküll proposes in which the acquisition of these "two worlds" takes place, he calls it: *functional circles* (Figure 1).

Fig. 1. Functional Cycle; (Modified from Uexküll, 1926, p. 155)



The preceding scheme suggests that objects are everything that exists outside the psyche (inner world) of the subject, that is, what is arranged in the immediate environment with what interacts, which includes its own body. Or, put another way, it includes everything that occupies the so-called "subjective space" from where the subject "cuts" the environment to configure his "surrounding world" (*Umwelt*) composed of the "perceived world" (*Merkwelt*) and the "world of action" (*Wirkwelt*). From his inner world (Innenwelt), the subject tries to make sense of the environment to which he must adapt to stay alive (Uexküll, 1926, p. 155).

Paraphrasing Ortega and Gasset we could say: "The subject is he and his circumstances." Understanding by 'circumstance' the things that are around the subject, and that allows him, make sense of the universe by communicating with it (Ortega y Gasset, 1914, p. 322).

"All our acts and one-act is to think, go as questions or as answers always referred to that portion of the world that exists at all times for us. Our life is a dialogue, where the individual is only an interlocutor: the other is the landscape, the surrounding." (Ortega y Gasset, 1917, p. 149. Reflections on biology after reading 'Ideas for a biological conception of the world' from Uexküll).

To the universe where the biological, psychic or equivalent and social or equivalent life of the subject takes place, his *Umwelt*, in TL, we have given him the bombastic name of *chronobiosphere*. There, their real systems unfold in a continuous "dialogue": their "perceived world" (bio-external system), their "world of action" (sociocultural system) and their "inner world" (psycho-internal system).

Fig. 2. Chronobiosphere (Explanation in the text)

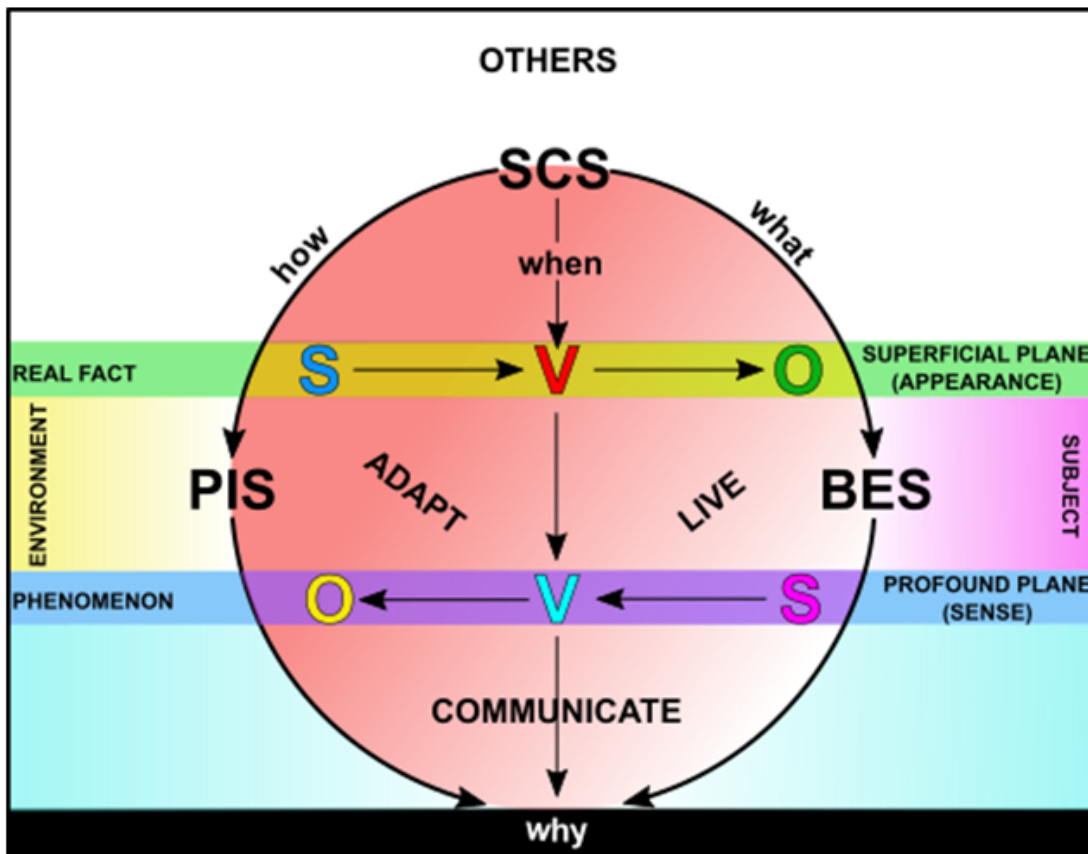
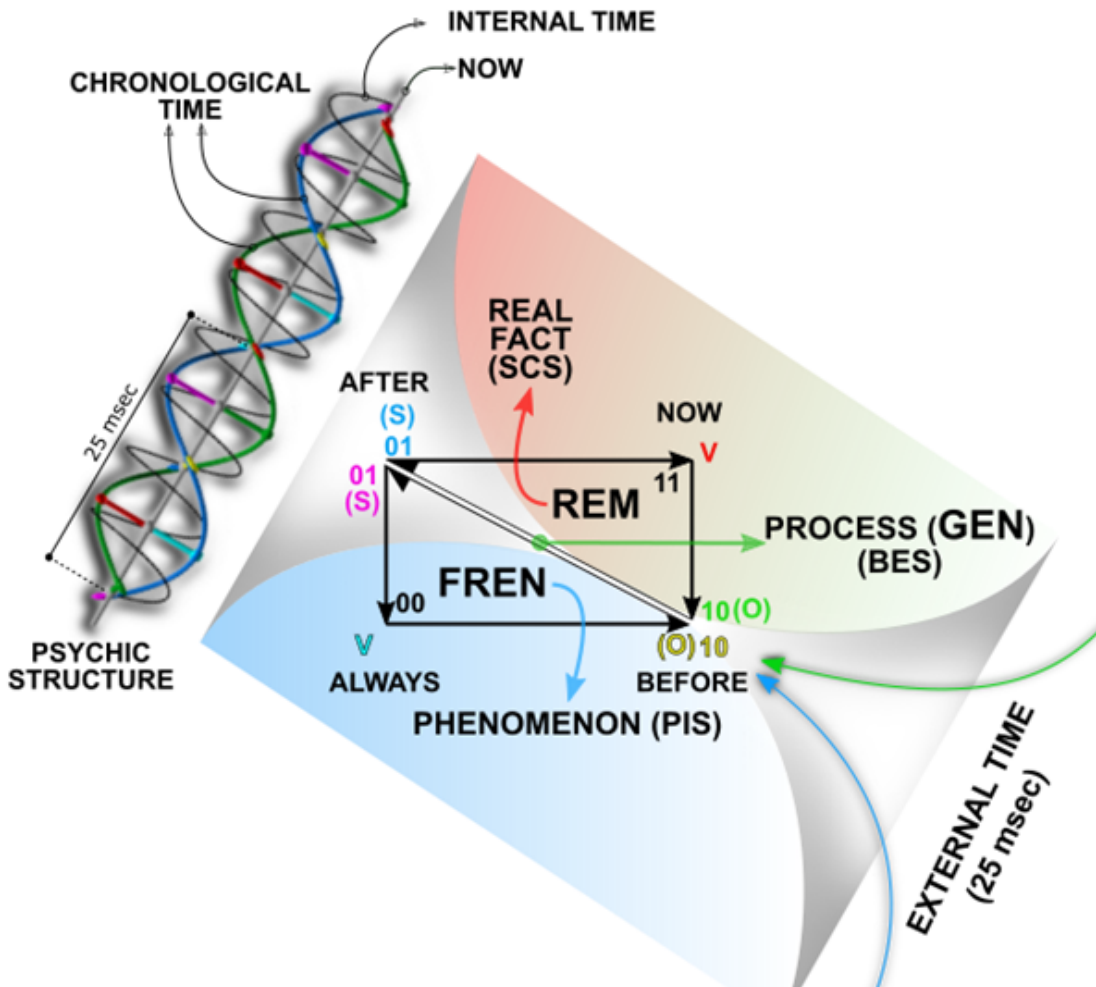


Figure 2 shows that the subject is faced with their environment through the appearance of real events, which comes from the *sociocultural system* (SCS), impact on their *bio-external system* (BES) generating a series of “neurological processes ” The simple and at the same time complex (quantitative) relationship that unites an S and an O in a “real fact” generates in its *psycho-internal system* (PIS) the need to find some sense in that fact that transforms it into a “phenomenon”, a qualitative relationship between S and O that will become part of your experience. As Ortega y Gasset said, all acts are generated by a "question" of the surrounding environment (in this case, a stimulus), which requires an answer. This that is produced by an "interpretation" of the phenomenon by the BES is projected through the SCS to "the others" who inhabit the Umwelt, also form part of the "subjective space."

In summary, the previous scheme suggests that the subject has an urgent need to live and that to survive, he must adapt, something that he can only achieve, communicating with his "subjective space." This simple equation is solved in a series of "dimensions" inherent in its *chronobiosphere*.

3.0 TEMPORAL DIMENSIONS

Fig. 3. Universal language syntax; (Explanation in the text)



The dimensions mentioned above, which are not spatial but temporary (as we will see) allow us to elaborate a coherent answer to the following questions posed by the Umwelt and that has to do with the action (the answer): 1D: What to do? (S - after) 2D: How to do it? (BES - before) 3D: When to do it? (SCS - now), and 4D: Why do it? (PIS - always).

In Figure 3 on a synthesis of what has been said, the temporal dimensions are displayed, thus forming the "syntactic rules" of the universal language that governs subjective reality. This universal language is written with tatters of time, and its syntactic core is a PAU (Salatino, 2017). Let's see how this language is built. The subject and his Umwelt, that is, his "perceptive world" (the domain of the GEN - see Appendix), his "world of action" (scope of the REM - see Appendix), and his "inner world" (property of the FREN - see Appendix), faces chronological time.

The time that can be measured with a clock (which is why it is called 'chronological' or 'external'), of a discrete nature, is irreversible and "flows" from a "before" to an "after." This is, from an "object" present in the "now," to a "subject" that will be impacted later, at the end of a "real event," by a perception. Thus, the transformation or visible change (V) that links the subject (S) and the object (O) in a "fact" arises, giving rise to the appearance that triggers, in the bio-external system (BES), a "neurological process." Such process, bearer of a specific "content" that must reach the cerebral cortex (layer IV). Almost simultaneously, the process is triggered that, through the psycho-internal system (PSI), will give rise to the "continent" or the non-obvious transformation (∇), which, through providing the necessary temporal context, will record in the psychic structure (experience) during the internal or psychic time, of the perceptual integration that

causes the manifestation of a “phenomenon”, projecting a response. This phenomenon represents having found “meaning” to a real event, that is, having determined that the response made to a stimulus was useful to stay alive. This "sequence or syntax" (fact → process → phenomenon) is repeated "always," indefinitely, while we are alive. Being the "now" (kind of "rapture of consciousness"), as we will see below, the only "temporal point" of contact between chronological time and internal time.

4.0 A PLEAT IN THE TIME

To address the issue of time in a fun and simple to understand, we will invoke in a somewhat impertinent form, the Greek gods who had the absolute time domain. These gods are Krónos (*χρόνος*), Aión (*Αἰών*), and Kairós (*καιρός*).

Invoke these gods confronts us, nothing more nothing less, with life and survival, but also with death; the two temporary antipodes that must cope all living things.

- *Krónos*: is the God who takes the place of ancestral father (Uranus) for being who allowed the genesis of all that exists, to castrate the father and so his seed spilling on Mother Earth. To avoid fulfill the prophecy that one of his children would revolt against him, finished devouring all his descendants. Thus, *Krónos* becomes the god of death of all the finite, order to remain infinite. He is the god of eternal be born and perish, the representative of the period that there between life and death. He is the time of apparent motion (the paradigm of static and discrete), of the before and the after, the linear and irreversible time of the clock, in short, is the time of belief, and of the enslaving and eternal present.

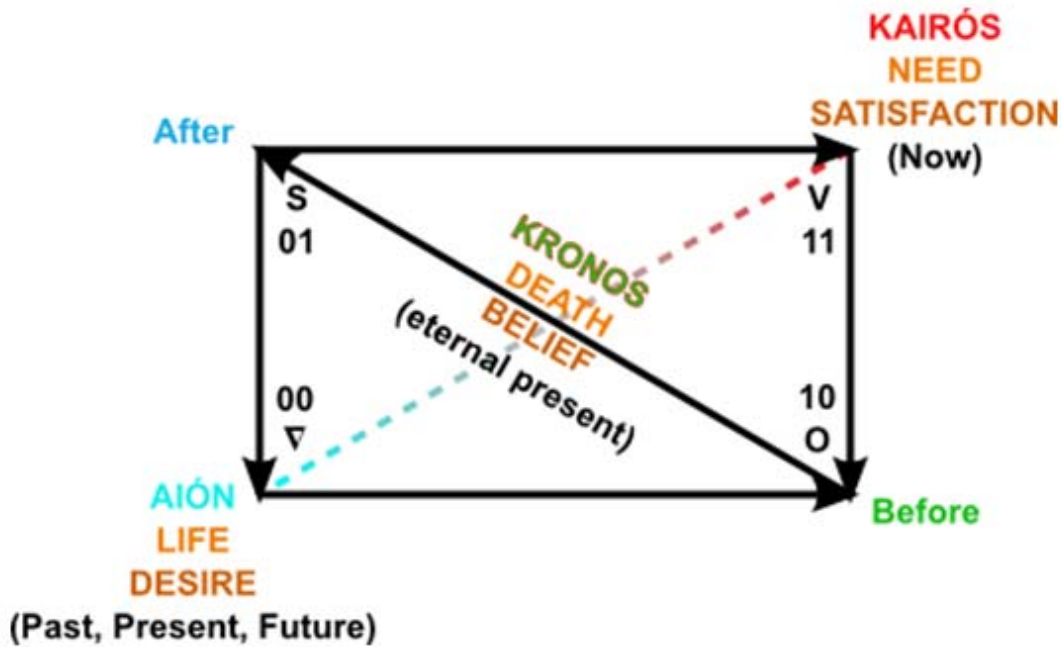
- *Aión*: this God is eternal by nature itself, which without generating anything nor moving (in appearance), gives sustenance to all living or anything that moves of its own accord. *Aión* is the God of life. In his figure is depicted surrounded by a snake biting its tail, the undisputed symbol of your eternal return. Owner of a past-future (preterit-future – See Appendix) independent of present. It is the time of the duration (the vital evolution of Bergson, 1889) and desire. Here we know it as the internal or psychic time, that whose nature is continuous.

- *Kairós*: this god, was represented by the Greeks as a good-looking young man with winged feet and an 'unbalanced balance' in the left hand. These symbolic elements tell us of the hallmarks of this time. It is the time of opportunity, the only creator, according to the Greeks, of the beauty. It's a fast time (winged feet), or better, instant of 'zero' duration to the eyes of *Krónos*. It is the time that connects the other two times that confront in direct opposition, but always ensuring stable imbalance prevails in favor of life (stable disequilibrium) and in detriment of time of death. In this way, we can't 'infer' it as the middle ground between the two opposites.

If no exist *Kairós*, we could only be born and die. Since we do not belong entirely to either of two eternities (nor to the life nor the death), we need an intermediary that represents us to be able to transcend. This is the time that belongs to us in its own right; this is the 'pleat in the time' where we can distinguish survival time (biological and discreet), of the time of life (psychical and continuous). It is the God who appears as a thunderbolt as the inspiration that takes us to another dimension (4th dimension or psychic). It is the time that snatches away from us of the hands of *Krónos*, and puts us in the Aión hands, violating the standard linearity of time of death to everything to change in-depth, while on the surface, everything remains the same. *Kairós* is an instant 'empty' of *Krónos*, unique and unrepeatable that not embodies the present in its entirety, already that always that is to come, already has disappeared. It the time of the 'now' (See Appendix) of the event, of the facts, of perception, of observation. *Krónos* is not who tells us the story, but *Kairós* that since its 'pleat' sets the tone for *Krónos*, already it introduces the time of life in the time of death, is that instant which without being it contends the events or the facts that mark the apparent time. For all these reasons, *Kairós* is the intermediary of the need that separates life from

death and of the opportunity of satisfaction that relates a desire with a belief, or that saddlebag where we accumulate throughout our lives, all the truths that we can capitalize and give sense to our subjective reality.

Fig. 4. Universal autonomous pattern of time



References: - - - - -: pleat – S: subject – O: object – V: apparent transformation
 ∇ = chrono-independent hidden transformation

Figure 4 shows the definitive relational arrangement of the times considered, while that is useful to realize that the 'heart' of this relations is a PAU (universal autonomous pattern), that is, which has the same logic that the universal language and this is because these times relate the four dimensions that we have established as characterizing of subjective reality, namely: 1D) What, structural and perishable, controlled by Krónos; 2D) How, functional and ever-changing, controlled by Aión; 3D) When, the chance, managed by Kairós, and 4D) Why, the change of dimension possible through of the 'pleat'.

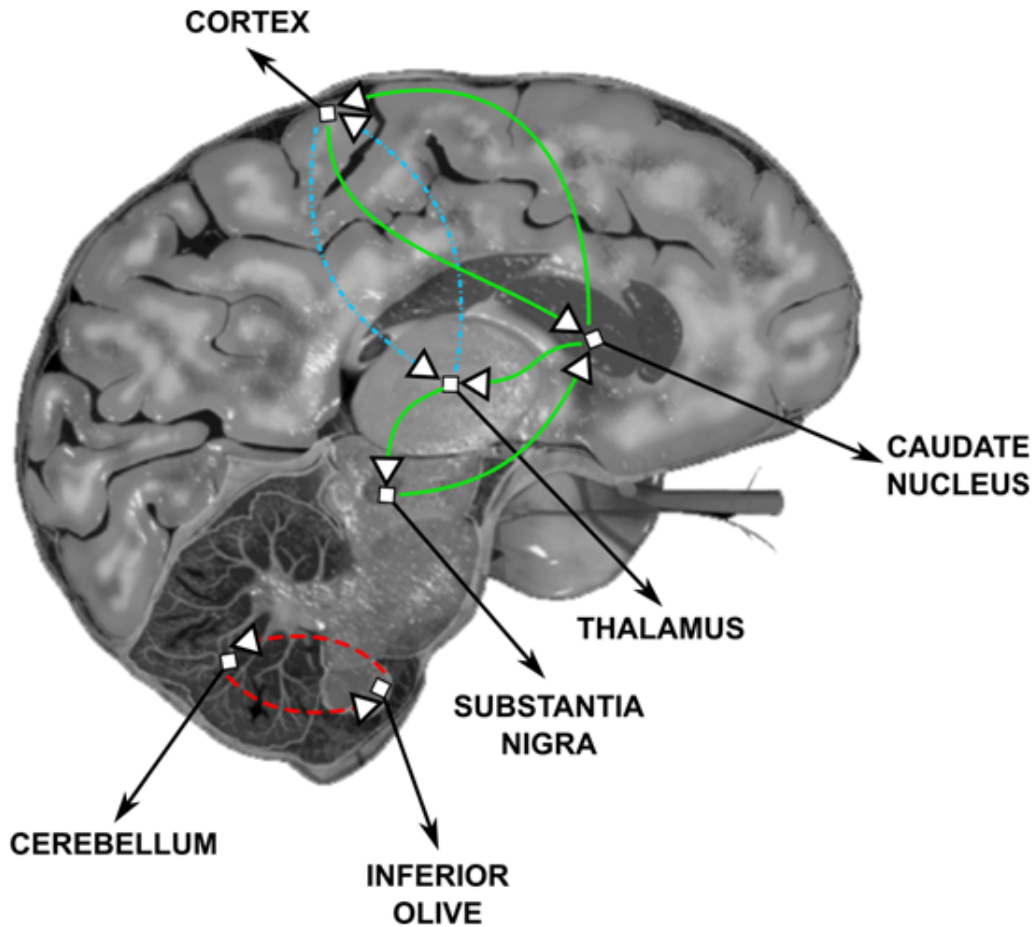
In turn, each of these times individually, meet the same dimensional arrangement:

- Krónos*: (what): death - (how): belief - (when): eternal present
- Aión*: (what): life - (how): desire - (when): past-present-future
- Kairós*: (what): need - (how): satisfaction - (when): now
- Why: involved dynamic and heterarchically (simultaneously) to all.

5.0 THE CENTRAL NERVOUS SYSTEM AND TIME

There is enough evidence to compose a model of temporal management in the Central Nervous System (CNS) like that proposed. Without going into detail, we will review the subsystems that manage both the subject's relationship with chronological time as well as the disposition of internal or psychic time. (Figure 5)

Fig. 5. Neurological pacemakers



References: — (perception) - - - (psychic structure) - - - (movement)

The CNS, like any organ in our body, works because its central cells, neurons, can maintain permanently and due to high energy consumption, an electrical imbalance between its interior and the environment where they are located.

This "electric motor," synonymous with cellular life, in the neuronal field, also has some characteristics. Perhaps the most relevant is the possibility of autonomously changing your level of excitement; that is, generate stimuli and propagate them according to the different functional needs; or, conversely, inhibit its operation to modulate its responses.

Not all neurons administer the previous mechanism in the same way (Llinás, 1988), giving rise to oscillatory behavior, which allows them to form networks that work at different frequencies. This means that some nerve cells can regulate and modulate brain activity, becoming "real pacemakers", which indicate what to do, how and when to do it.

We can describe three neurological pacemakers (Figure 5). The pacemaker formed by the connections between the basal ganglia, the thalamus, and the cerebral cortex, in charge of ordering the perceived patterns and coordinating with the level of consciousness existing at the time of perception to select the appropriate actions in response to the stimuli received (Salatino, 2013, p. 101).

A second pacemaker that allows explaining, among other things, the mechanism that makes it possible to unify the perceptual process through the differential functioning of the thalamocortical circuit, where specific thalamic nuclei receive what the environment (external reality) provides, and the nonspecific thalamic nuclei give the necessary temporal context to the previous content (Llinás, 1988, p. 1661). The mechanism underlying here is the detection by relative simultaneity that operates at the level of the pyramidal cells of the cerebral cortex (Llinás, 1994, p. 262), which also

allows it to control the process necessary to make sense of the facts perceived, and thus give rise to the “psychic structure” (Salatino, 2013, p. 109).

Finally, the pacemaker represented by the connections between the inferior olive (medulla oblongata) and the cerebellum, which is responsible for generating and coordinating the motor responses selected by the basal ganglia or learning new routines, functioning in this way, as an “operative memory” where the routines learned, with due experience, are transformed into habits; that is, motor routines that run automatically.

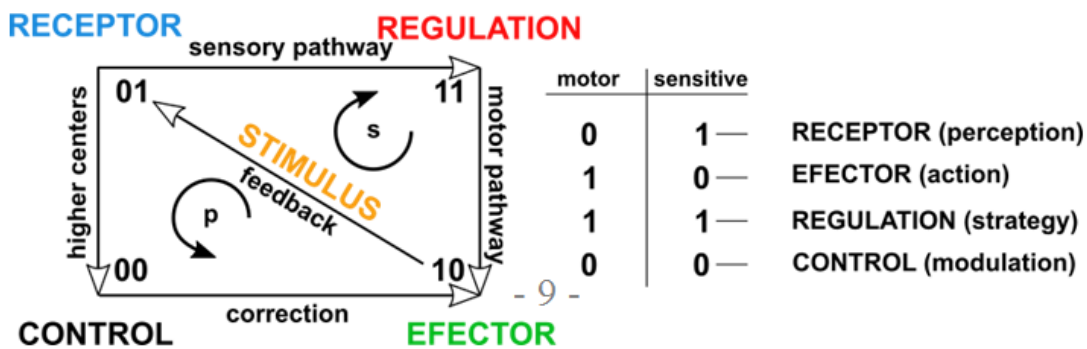
On the other hand, there is a psychic pacemaker (Ibid, p. 176), which operating in the same neurological structures already described allows controlling, at the same time, the different evolutionary and functional aspects of the psyche. This functional aspect is based on a kind of temporary engine.

5.1. Structure and function of the psychic apparatus

Faced with a real event, our CNS reacts basically as follows (Salatino, 2016a):

- 1) It perceives (receives a stimulus) and evaluates what is perceived, preparing the system for the elaboration of an adequate response.
- 2) Develop an answer according to innate patterns or those learned with experience.
- 3) Execute the response, either automatically (for being an inborn routine) or following the guidelines of a habit.

Fig. 6. CNS automatic control PAU



It can be seen in Figure 6 that everything starts with a stimulus, which can come from outside as well as from the body itself, and that impacts the recipient. In a sensitive way, the signal travels to the regulatory centers where the selection of the type of response that is carried out according to a specific strategy and tactic. What is this selection based on? Let's take as an example that we are attacked by fire. In this situation, I can have two attitudes: defend or attack. The defense can be given, in the strategic, by the escape and in the tactical, by doing it as quickly as possible; while the attack can be oriented to try to put out the fire. The regulation process fulfills the function of restoring, as soon as possible, the state of equilibrium before the appearance of the disturbance that means, for the system, a stimulus. (All this occurs at the superficial level - s in the figure).

The signals that originate when executing the response to the stimulus feedback the system so that they are “compared” with those originated by the regulatory mechanism. If there is any difference (error), it is sent to the higher control centers, which are responsible for making qualitative adjustments (neuromodulation), which may require several deep cycles (p in the previous figure). This is where the learning of a new task begins and what will later give rise to the PAF (Fixed Action Patterns) (Llinás, 2003, p.155), the foundation of our habits or automatic behaviors.

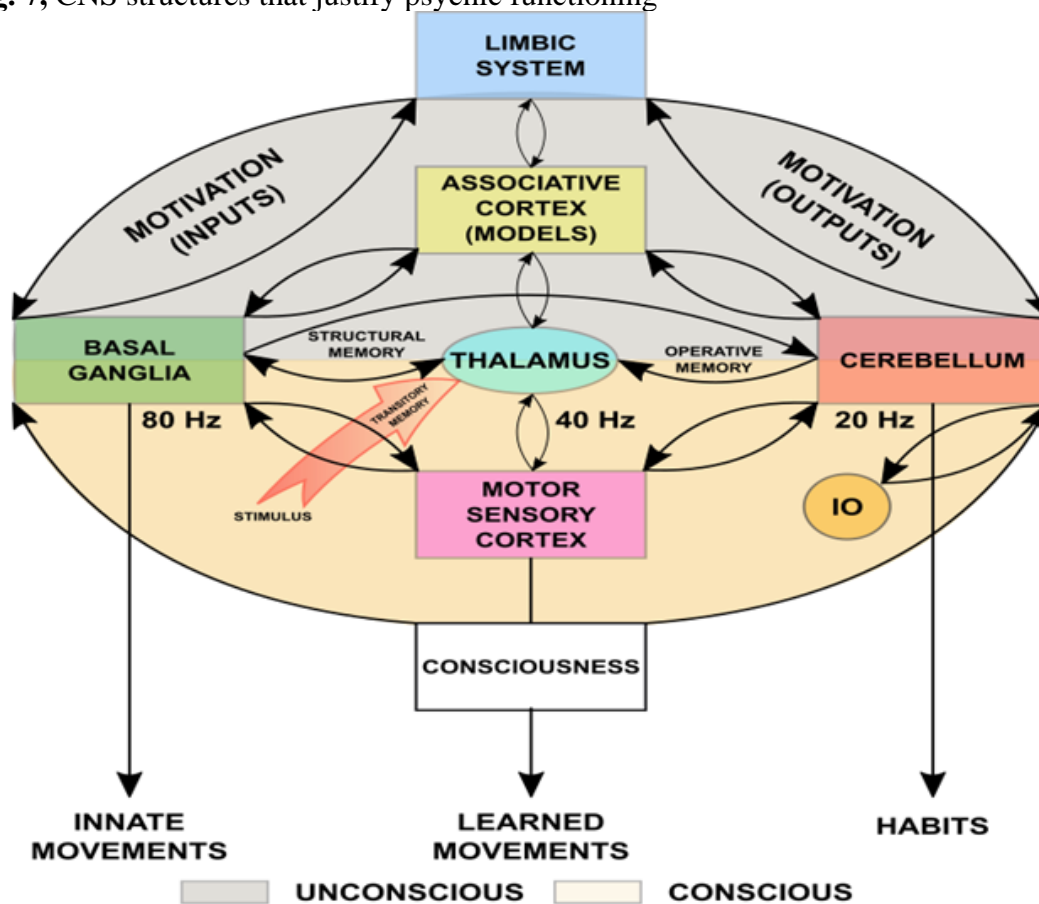
The processes detailed above are carried out by specific neurological structures that fulfill these functions. In this way, support is given to the psychic function and structure, respectively.

It should be clear, although it seems strange, that the functional aspects of the CNS give rise to the structure of the psychic apparatus, while its nervous structures (from neurons arranged in

column-shaped arrangements to the different nuclei of gray matter) allow them to develop the normal operation of said deviceL "All living beings depend on the information they have about their outer world and their inner world" (Barth et al., 2012).

- And we could add - that they can establish a relationship between them through adequate learning, knowledge, and interpretation, without which their survival would be impossible. In superior animals and man, through an adaptive mechanism, a considerable variety of 'specific filters' have been developed that allow them to acquire everything alien to their experience. These filters are nothing other than sensory systems (external and internal) that enable the subject to relate to their environment; something relevant if we consider that determines the behavior and conduct that the subject will exhibit to preserve his life.

Fig. 7, CNS structures that justify psychic functioning



The above scheme summarizes the anatomical substrate that justifies the CNS reactions. That is the perception of the stimuli that once reached the thalamus (See Appendix) are distributed between the basal ganglia (BG) (See Appendix) and the cerebral cortex. BGs fulfill several motor, cognitive and affective functions, given the connections they maintain with the cerebral cortex, the limbic system (See Appendix), and the cerebellum. The functions of the BG include the selection of the appropriate response in case of previous experience or an automatic response when a habit has already been formed, but also, to select some innate response (reflexes) or to arrange the nervous structure to learn a new response.

The connection of the BG with the limbic system ensures the degree of motivation necessary to adapt the response to the demands of the environment and provide it with enough attention (level of consciousness) to project it, but also to 'register it' (Structural Memory).

When a response is used repeatedly, it is automated and registered in the cerebellar cortex. The cerebellum is responsible for the management of these automatic patterns that support motor

habits (walking, talking, etc.) (Operational memory). The bidirectional connection between BG and cerebellum allows not only the proper selection of the motor pattern but its conformation.

Finally, the connection of the BG with the cortex ensures compliance with, perhaps, the essential brain function: the prediction of response. When a suitable solution is found to a requirement of the environment; that is to say, when the demands are found 'meaningful', and it is "known" what to do to "continue with life", either from the point of biological life, as well as psychic (ensuring an appropriate relationship with the environment) and social (guaranteeing a convenient connection with others to ensure inclusion), a kind of "model" (Passingham & Wise, 2012, p. 88) is "registered" in the associative cerebral cortex, which is consulted via the BG, in order to it is the case (to respond to a situation already given before), trigger an early response to what is presented.

The connection between the thalamus and the cortex is responsible for the elaboration of the response, cognitive activity that means decision making through an unconscious mechanism, as well as the essential conscious support, something the latter that is achieved when the "detector of simultaneity" (Llinás et al., 1998) that lies in the thalamocortical system which is responsible for providing the temporal context inherent in the perceived real event (the here and now).

The cerebellum and its connection with the inferior olive (IO) (See Appendix) are where motor routines that are destined to become, with experience, become habits. Put another way, those routines that are combined unconsciously are available for when necessary and consciously projected.

6.0 CNS PHILOGENESIS AND SUBJECTIVE REALITY

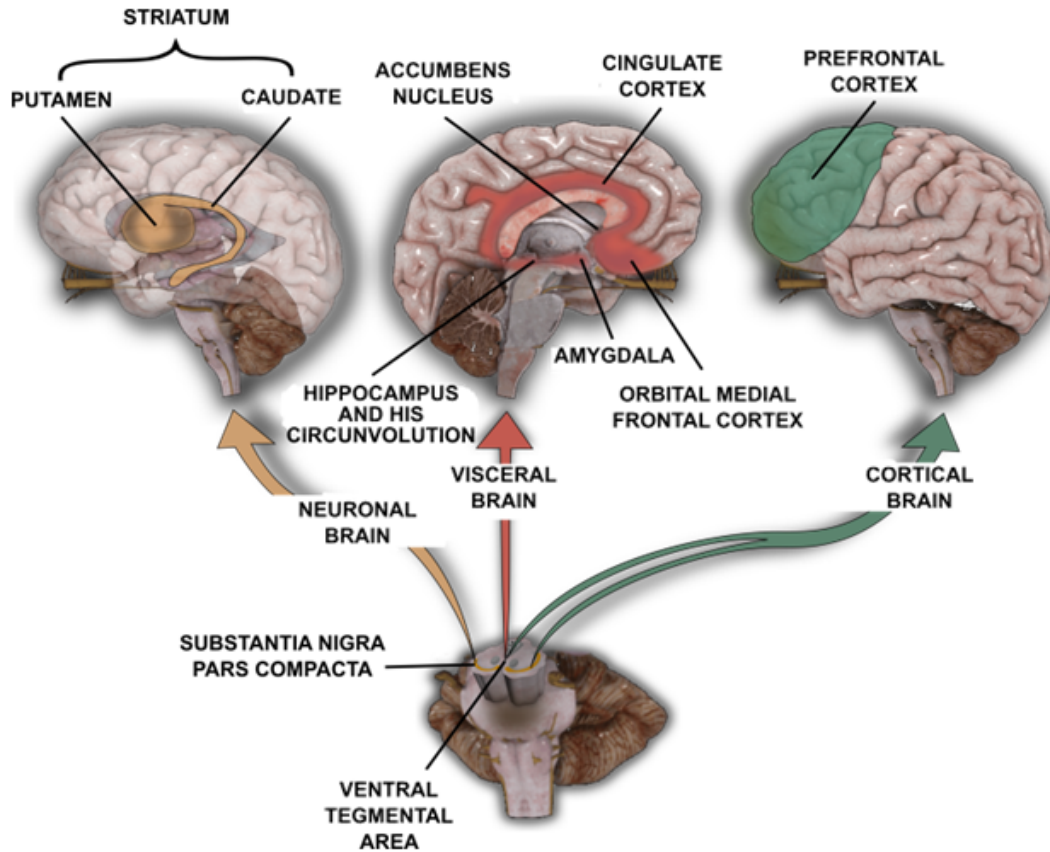
The simplest way to deal with the operation of the CNS is to show that there are evolutionary traces in it that determine the different systems that address the different approaches that our subjective reality makes us and to which we must give an adequate solution if we want to continue being part of it as long as possible.

Phylogenetic evidence shows a CNS with a tripartite neuroanatomic architecture related to the organization of behavior (movement and other conducts) (Salatino, 2012). (Figure 8) According to evolutionary antiquity, and only for didactic purposes, we can identify each of these parts as 1) neuronal brain where the psychic structure depends only on the functioning of neurons and the structures that support it are the brainstem (See Appendix) and basal ganglia; 2) visceral brain that sits in the limbic system where the neural networks are where the affections that structure the psyche arise; and 3) cortical brain whose sustenance is the cerebral cortex in its maximum development degree which allows the human being, and only him, to achieve a psychic structure (neuronal arrangements) that enables him to handle the cognitive phenomenon as the supreme manifestation of his subjectivity.

Dopamine is a neurotransmitter that is present in different areas of the CNS and is very important in the regulation of the motor activity of the organism, that is, in the projection of the response. But, also, cognition, motivation, milk production, sleep, humor, attention, and learning. In other words, it is dopamine that puts into operation the different strata of the psychic structure described by the real system (Salatino, 2009) that must be addressed. That is, the biological or bio-external (neuronal brain), the psychic or psycho-internal (visceral brain), or the sociocultural (cortical brain).

Dopamine is the one who defines, as we have just seen, what structures are part of each of these 'evolutionary brains', but the intimate mechanism that allows the selection of one of them according to the real system to pay attention is of a temporary nature, since each one has as a guide one of the neurological pacemakers described above. The three pacemakers have a base frequency that identifies them, like this: the pacemaker of the BG (perception) oscillates approximately to 80 Hz, the thalamocortical pacemaker (psychic structure) to 40 Hz and the olivocerebellar pacemaker (movement) at about 10-20 Hz.

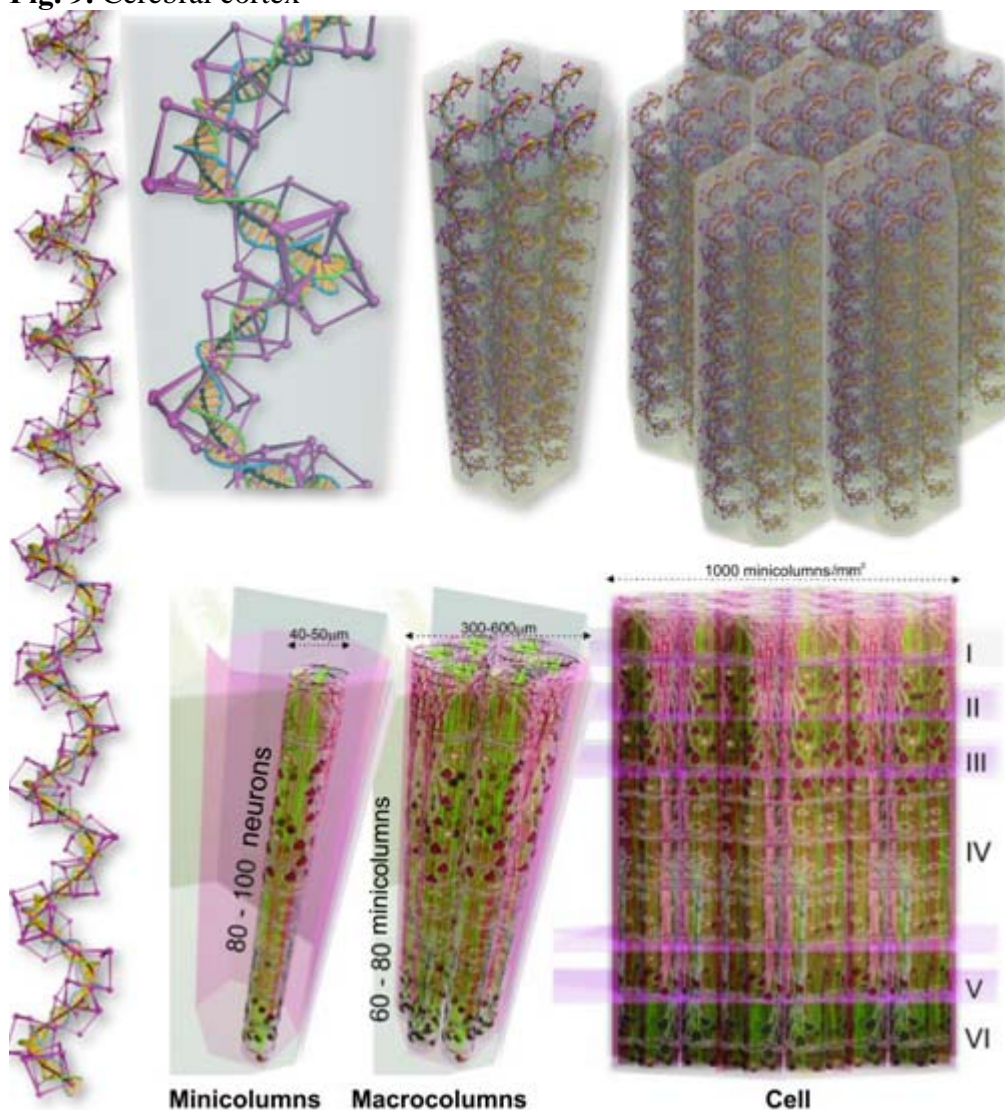
Fig. 8. Dopaminergic system



7.0 PSYCHIC TIME

Where is the time management itself? Well, in the psychic pacemaker, resident in the cerebral cortex and where the psychic structure is also housed, the administrator that from its operation determines the functional organization of all other pacemakers. Let's look succinctly at this structure (Figure 9).

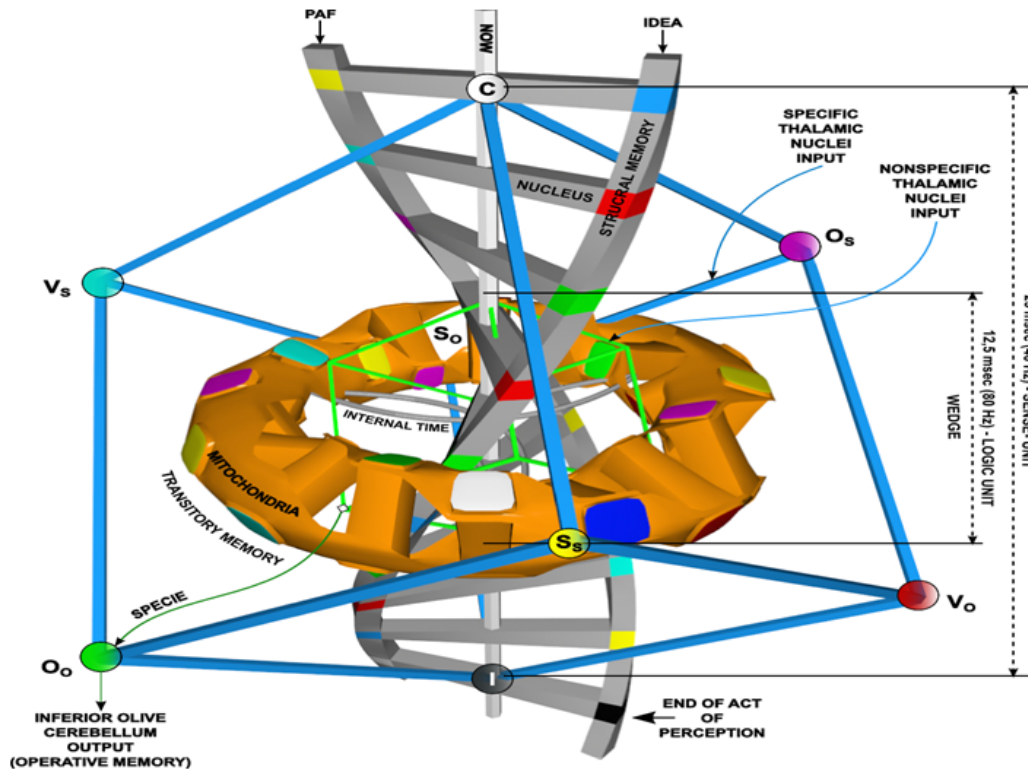
Fig. 9. Cerebral cortex



References: the inferior graphs correspond to a recreation of the cerebral cortex of area 17 (visual cortex) of the monkey. The upper and left lateral graphics are an emulation of said structure, from the TL (Salatino, 2009).

Within the theoretical minicolumn, we have idealized a psychic cell or ‘psychocyte’ that represents a logical-functional arrangement formed by 16 hypothetical neurons strongly interconnected as a hypercube that allows recording the functioning and neurological disposition of the CNS according to the latest research. (Op. Cit.) (Figure 10).

Fig. 10. Psychocyte or psychic cell



References: C: consciousness - I: unconsciousness - IO: inferior olive

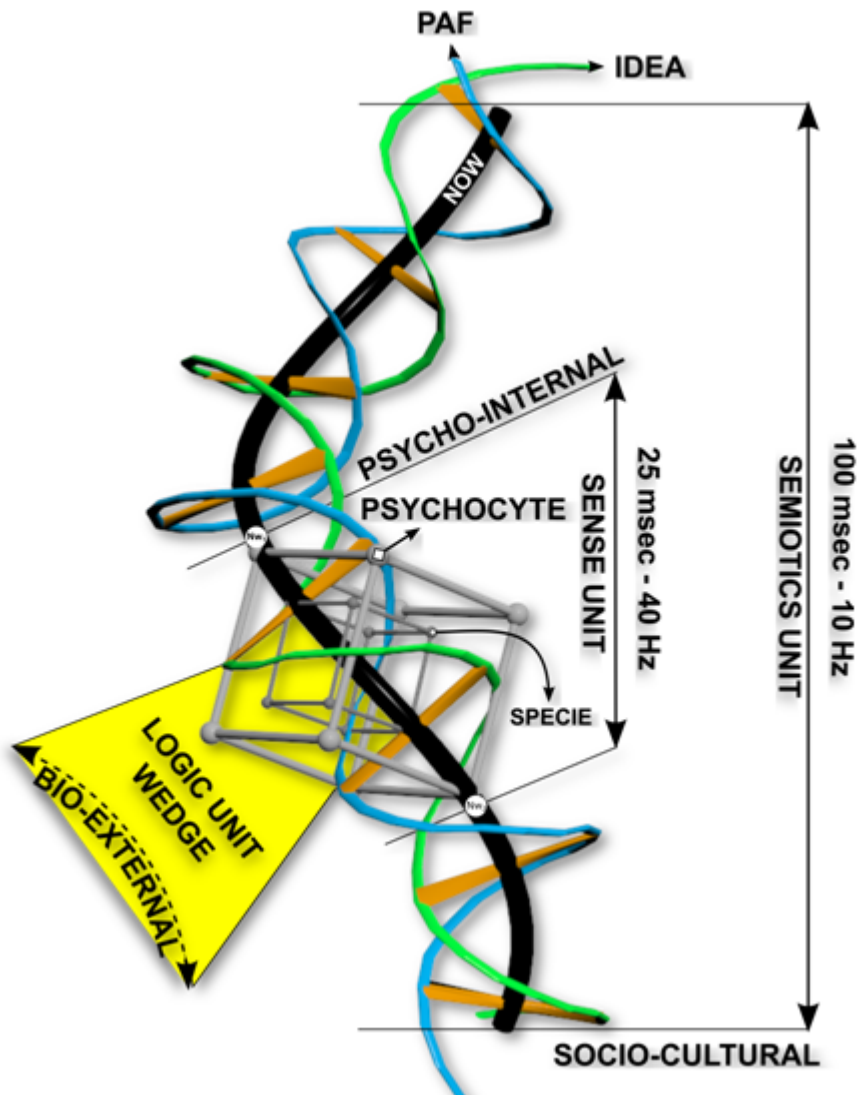
The previous figure shows the theoretical arrangement that the psychic DNA would have (Salatino, 2009) within a psychocyte, which is where the structural memory or history of the subject (psychic structure) that is governed by external or chronological time is located, since there would be a record of a real event every 25 msec. (40 Hz). The nickname corresponds, given the similarity with the DNA molecule found in the genes. A similar structure was found in the projections of the dopaminergic system. Striatonigrostriatal pathways (BG) with the associative and motor cortex, and limbic system, in primates form an ascending spiral like DNA (Haber et al., 2000).

We must highlight some characteristics of this psychic cell. Through its nucleus, which we call "species," passes a helicoid whose axis represents the "now" of chronological time; that is when chronological time and psychic time (temporal pleat) come into contact. While his "arms," one represents the "ideas" or the constancy of a real event which was made sense; while the other makes available the response or PAF (fixed action pattern) that corresponds to the perceived stimulus. Also, we can see in the figure the entrances from the thalamus to the "cell nucleus" and its periphery, as well as the exits to the IO and the cerebellum where the *operative memory* is found (from the routines learned and habits). Finally, we emphasize that the axis of the "now" goes through one of the main diagonals of this hypercube that represents the psychocyte. The relationship between the extremes of this diagonal records, when the psychocyte is fully deployed, the level of consciousness shown by the subject.

The oscillating structure of our psyche is the minicolumn (Figure 9) that can be composed, by way of example only, of 40 psychocytes, which can record 25 msec of the chronological time, each. This would give the minicolumn the possibility of a temporary record of 1 second (1000 msec).

The management of psychic, qualitative, or internal time is carried out through three clocks (Figure 11).

Fig. 11. Internal time clocks



The previous figure shows us how the psychic structures are arranged around the axis of chronological or external time (now) that also forms a helix. For reasons of clarity we have represented only one turn of said spiral, where the different functional units have been discriminated; that is to say, the different frequencies in which the minicolumn oscillates, which is used as a selector mechanism of what must be registered of a specific real system (idea), and to elaborate and also register the corresponding response to the perceived (PAF), two of the elements that make up the psychic structure.

In Figure 11, are defined three operating units. These are the *logical unit* that is put into operation when the minicolumn oscillates at 80 Hz and serves to work in the *temporal wedge*. That is, in the half of the time between two now consecutive (Ah_1 and Ah_2), where it is involved the *species* or the structural unit of the psyche (the nucleus of the psychocyte), whose management is unconscious and is linked to the bio-external system. The *unit of sense*, when the minicolumn oscillates at 40 Hz, which is used to put into operation all the systems that operate during wakefulness (also during sleep, when we dream): in the first quarter of the time between the nows, the system perceptive, and in the last quarter of this time, the motor system to give an adequate response to what was perceived. Thus, is completed the 25 msec of a psychocyte or the functional unit of the psyche, of an unconscious nature and foundation of the psycho-internal system.

Finally, the *semiotic unit* is selected when the minicolumn oscillates at 10-20 Hz, involving four psychocytes. Mixed nature (conscious and unconscious) is used to communicate with the environment and with others, so it is linked to the sociocultural system (Salatino, 2017).

In summary, for the integral management of the psyche, a series of neurological pacemakers are available that operate the thalamus-cortical circuit (cognitive) through relative simultaneity; while the olivocerebellar system (of volitional nature) works through absolute simultaneity. The psychic pacemaker, meanwhile, operates with absolute simultaneity to identify the constituent elements of the real events (Salatino, 2013, p. 275), so, in addition to allowing the construction of a psychic structure according to what is perceived, it will enable us to know the subjective reality, that is, to "making it flesh."

Fig. 12. PAU of operating units and modulation

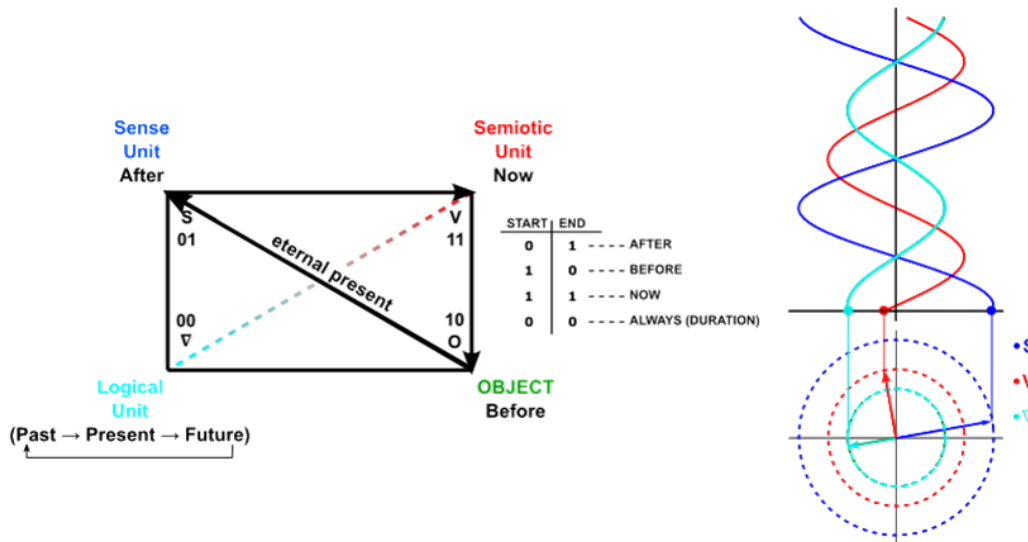


Figure 12 shows the relationship between *operating units*, but also, shows us how the selection of each one is made when working it with a single carrier wave (for example, 40 Hz as occurs in the cerebral cortex). In this case, the selector mechanism is phase modulation, where the phase of the carrier wave varies directly proportional according to the modulating signal.

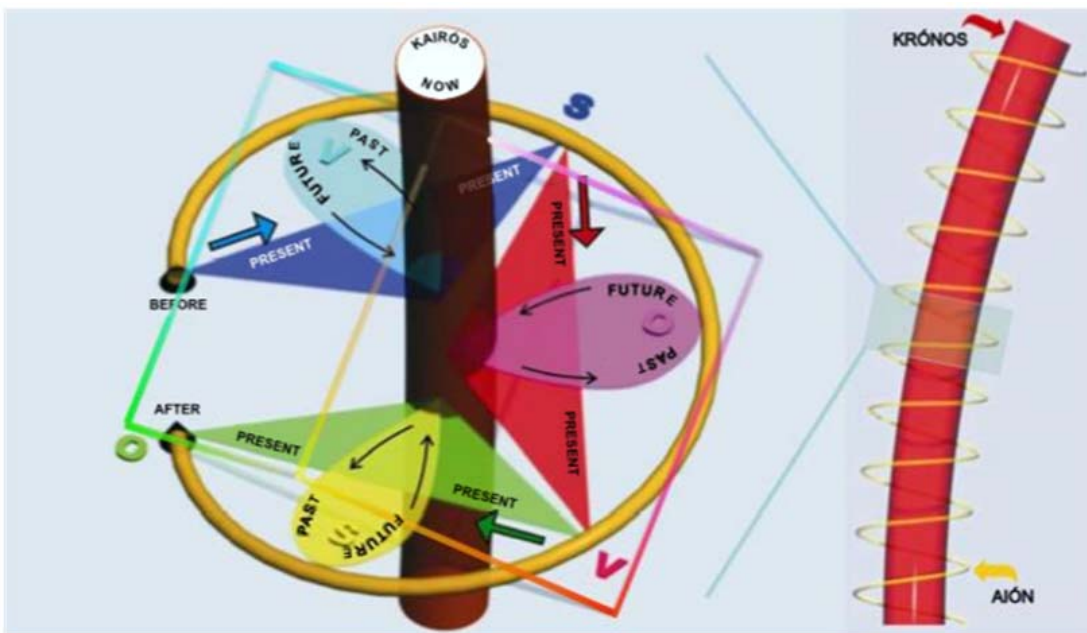
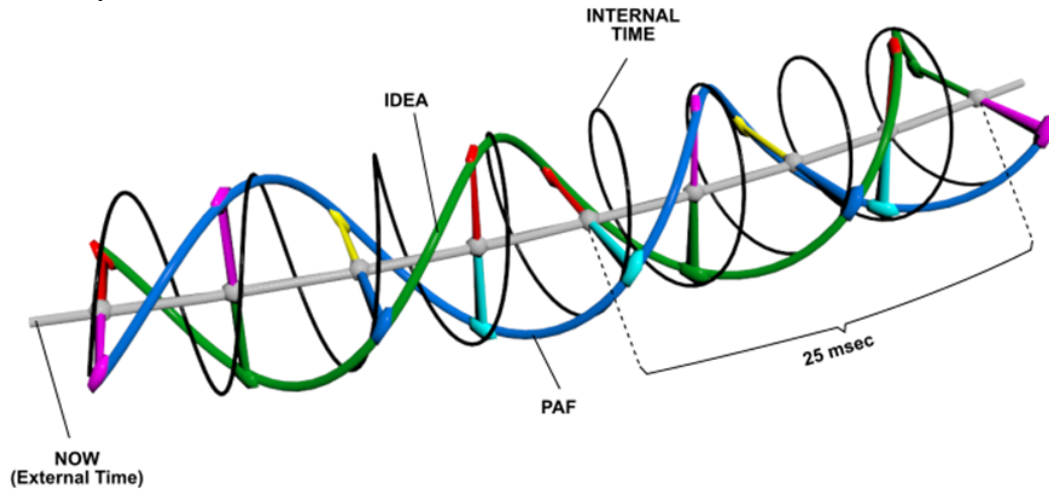
7.1. Dynamics of psychic time

The temporary coordination of the operational units gives rise to a kind of “functional geometry” that is specified in the structure and functioning of the psychocyte (Salatino, 2018).

The psychocyte is posed as a synchronous temporal assembly of two cycles with the opposite direction of rotation that allows to “retain” in its course, the aspects that arise from the contact that the psyche (the *psycho-internal system*) maintains with the outside, whether extracorporeal or from within the organism.

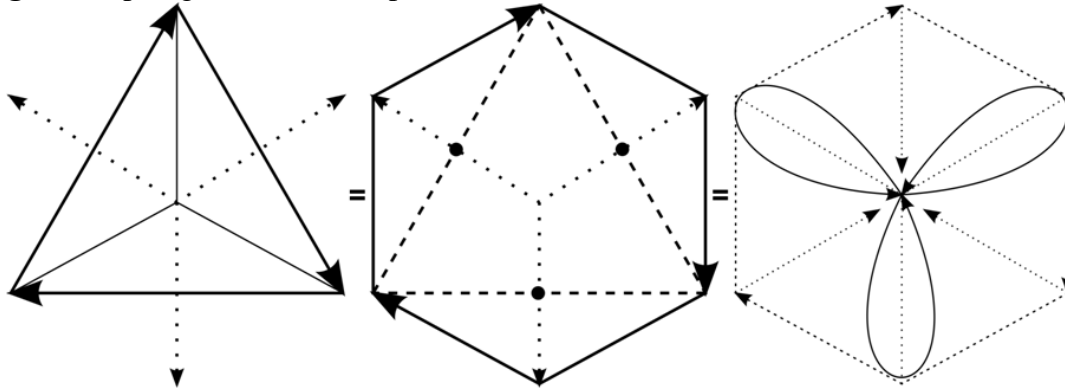
Figure 13 shows the proposed relationship between the psychic structure (psychic DNA) and internal time. In the upper scheme, we see a helical display of internal time, like that shown by the elements that make up the structure, as it also presents, although with a much larger radius, the external time represented by the “now.” The only difference that can be seen there is a higher frequency of internal time concerning the other cycles.

Fig. 13. Psychic DNA and internal time



But in the lower scheme we can see that the internal time, in fact, describes a “trifolium” that cycles in the opposite direction for the past, future and now (within the eternal present) and at a higher speed than the superficial “triangle” that represents the external time, in its unique and “eternal present”.

This representation through a trifolium of the internal time is not capricious but arises from a requirement of the TL regarding the dynamic disposition of the superficial and profound levels, which must turn in the opposite direction. One way to solve this is through Topology (Figure 14).

Fig. 14. Topological homeomorphism

7.2. How does the proposed model work?

The time that physics handles, which we recognize here as external time, limits its action to simultaneity. In fact, everything we usually consider related to time has to do with simultaneous events it is a habitual behavior to fix what happens around us by the time that the clock marks.

Einstein (1905) taught us from his restricted relativity that simultaneity is relative, that is, it is not possible to say with absolute certainty that two events that occurred in different places may have happened at the same time. To test this phenomenon, we can review a simple example: in a room of cubic form in which light is turned on in its center all its walls, as well as the ceiling and floor, will be illuminated at the same time, since all are at equal distance from the light source. An observer placed over that center would see it thus. But if there is another observer in that room that is, for example, backed on one of the walls, he will see that it lights up before the one in front, since the path that the light has to travel to illuminate that one is longer, for, therefore, for this observer the fact ceases to be simultaneous.

If we now move the room at a certain speed, for the observer traveling inside and is located in its center, nothing will have changed since the lighting will remain simultaneous, but for someone who is fixed somewhere outside the room, observing how this one moves away, the simultaneity disappears, and this is because although all the parts of the room light up simultaneously, the distance that separates the static observer from each of the walls is different and then this information arrives at different times.

If we accept that the above represent two different aspects of the same real fact, we could also agree that each of those aspects is referred to a different coordinate system. In other words, they are a unique fact seen from two different references. To relate these aspects, it is enough to devise some system that allows one of the coordinate systems to be transformed into the other and vice versa. As Lorentz (1904) did with his “transformations” that were applied in relativistic physics (see Appendix), or Feynman (1972) when he proposed, from Statistical Mechanics, a model of two oscillators coupled to represent the two parts in is divided that the universe under study, without excluding the rest not analyzed.

In our case, what are the aspects of a real event to be considered? These aspects are two: a) the quantitative or external, what is seen and can be measured, what is discrete and what will be taken in this comparison as the reference or static system; in a nutshell, the objective, and b) the qualitative or internal, what is not seen and therefore cannot be measured, the continuous, what in this comparison will be taken as what moves or the dynamic, that is, the subjective. Both aspects form what we call in TL an identity (Salatino, 2012).

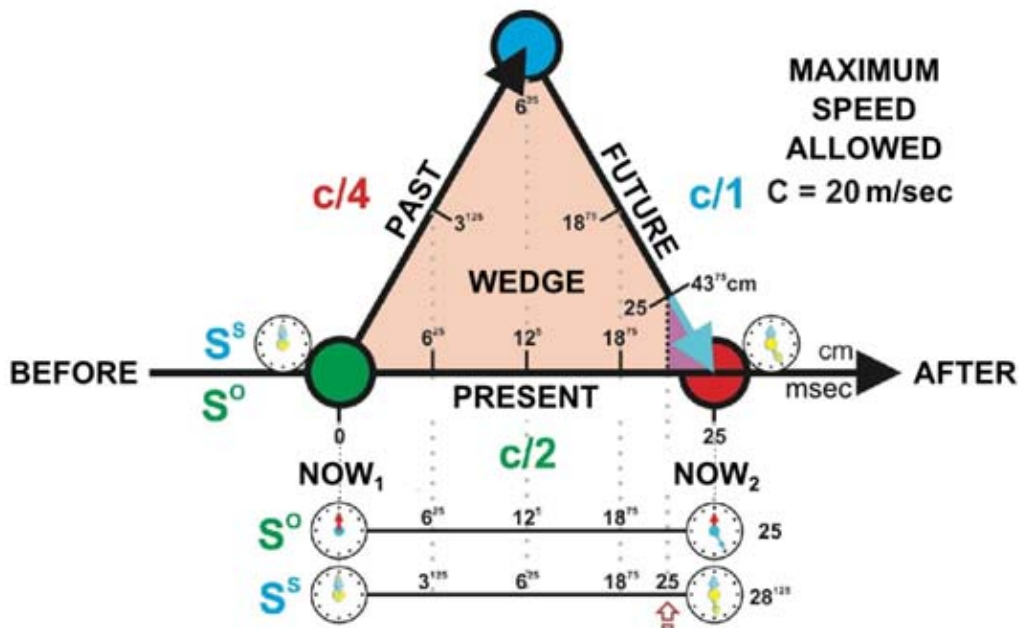
From the identities defined by the TL, we will take one of them: objective subject (S_O) / subjective subject (S_S), remembering that each of its components occupies a different contexture. Thus, S_O based on the superficial level serves as a contact with the surrounding external environment and represents, as a “content,” part of the objective. While S_S housed at the deep level, it is what characterizes part of the subjectivity, fulfilling the role of “continent.” According to the above and what is specified above, we can then say that S_O and S_S are referred to different coordinates.

To explain how internal time works, which as we could see in the previous point seems to be responsible for the only possible simultaneity that we could characterize without contradicting relativistic physics and abusing Einstein's patience, we will propose a competition that will have as protagonists : on the one hand, the one that we will presumptuously call the superficial self (S_O), who will be the representative of the quantitative world and worshiper of the god *Krónos*, and on the other hand, the no less presumptuous the profound Self (S_S), representing the subjective and devout world of the god *Kairos*.

To follow closely the alternatives of the dispute to star in this polytheistic duo, let's put some numbers to the example. The challenge is that a competitor, in this case S_O , must travel a distance of 25 cm in 25 msec, that is, at a speed of 10 m / sec; while the other competitor (S_S) must travel twice the distance (50 cm) at a speed that can reach twice that of the other competitor, that is, 20 m / sec. The slogan to fulfill is that both must reach the goal at the same time or simultaneously, that is, 25 msec after having left.

Each competitor has been provided with the necessary equipment for the contest. To the S_O , a flashlight and two clocks, one to control your travel time and another to control the time of your competitor, and the S_S , a flashlight and a clock to control your time. The rules to comply, apart from not exceeding the maximum speed, are: the S_S must make a light signal to notify its competitor every time it has covered $\frac{1}{4}$ of its trajectory, that is, every 12.5 cm traveled; while the S_O has to tell its competitor, in the same way, when it has covered half of its path, that is, 12.5 cm. The competition begins (Figure 15): both contestants start from 0 cm and at the time $T = 0$, with the same speed: 10 m / sec, that is, $c / 2$.

Fig. 15. simultaneity and succession



The S_O runs at a constant speed so we could label as the present between two concrete “now”, the S_S instead, goes into the depths of time in search of a future. The S_O receives the first light signal from the S_S , looks at its clock and checks that it marks the time $T + 6.25$ msec. This means that it is as if the S_S had traveled 6.25 cm on the surface. As you know that the S_S carries a speed equal to yours (10 m / sec), and as, as agreed, the signal it sent represents 12.5 msec of its time, a simple rule of three allows you to deduce that from the surface the S_S appears to move with a speed of 5 m / sec, this is equivalent to half the surface speed and a quarter of the maximum allowed ($c / 4$). Therefore, the S_O records on the S_S 's clock $T + 3.125$ because from the outside it is as if it had traveled 3,125 cm having used such a number of milliseconds.

The S_O receives the second light signal and, at the same time, sends its message to the S_S as established because it has already traveled half of its path. The calculations made by the S_O allow you to verify that the S_S persists in going at an apparent speed of 5 m / sec so, without hiding the hint of a victorious smile, it records the time $T + 6.25$ msec on the S_S clock and in his clock $T + 12.5$ msec. The S_O receives the third light signal, and as they have passed, according to its clock, 6.25 msec from the previous one, it deduces that by taking that time to travel 12.5 cm, the speed of the S_S has increased to 20 m / sec ($c / 1$, the maximum allowed). Undoubtedly, the S_S understood the message sent by the S_O , telling him that he was late and accelerated. In any case, the S_O thinks that it is a fact that he will be the winner because, for both of them to have reached their destination at the same time, the S_S should have adopted the maximum speed allowed from the beginning. Then, happier than before, he sets out to record the time $T + 18.75$ on the S_S clock, just like in his.

Subtract 6.25 msec to finish the competition. After 3,125 msec since then, the S_O , although almost certain of its triumph, still decides to make a check on its own to ensure the celebration. For this reason, and assuming that the S_S continues at a speed of 20 m / sec, it calculates what time it would have to register on the S_S clock at this precise moment. To do the calculation, it assumes the following: if in 1000 msec (1 second) it travels 2000 cm (20 meters), in 3,125 msec of the surface, which is where the S_O is standing now, it will travel 6.25 cm. Tremendous is his surprise when he makes the simple sum: $18.75 + 6.25 = 25$ since, if the equivalences are respected (1 cm = 1 msec), the S_S has just reached 25 msec, that is, it has reached the 'future' before that he and therefore is virtually the winner. Suspecting that the S_S could have cheated by moving at a faster speed than allowed, it performs a simple calculation to obtain the test that allows a possible challenge to the result. He thinks, if when he reached 25 msec, he had traveled 43.75 cm of his trajectory and this section covered him in 21,875 msec according to the records of his watch on the surface, in 1000 msec (1 second) he will travel 2000 cm. This result submerges S_O in deep frustration as this means a speed of 20 m / sec, which proves that the S_S has respected the rules of the game. The remaining 3,125 msec pass and the meeting of both competitors occur at the goal, at the same time. The S_O proceeds, not without surprise, to record the time $T + 28.125$ msec in the S_S clock as the final time used in the tour and higher the surprise even when comparing the watch that the S_S brings with its own; check that both mark the time $T + 25$ msec. The S_O , respectful of the data that it has been able to verify empirically accepts the S_S as a legitimate winner despite apparently having reached the goal at the same time as him.

What does show us the analyzed example? Taking as present the line that divides the past from the future in Figure 15, it is verified that in the surface is reached earlier than in-depth. There is a delay in internal time in the first phase that would allow 'fill' part of the transient memory, as we will see. On the other hand, the future is reached before in the depth that, on the surface, something that will explain, as we will see later, the prediction. The gap that remains between one now and the other will be known from here with the name of "temporary wedge," and it is in it where we have verified that things happen with the internal time while on the surface nothing changes.

Finally, it is shown that Einstein (1905) was correct in his statements: a) the simultaneity of the facts is only apparent. As we have seen, the clocks at the end of the competition indicate a difference of 3,125 msec when both competitors meet again on the surface, which while invalidating the simultaneity claims the intuition that makes us suspect that reality is generally not what that seems; b) the contraction of length, and time dilation (43.75 cm traveled in 28,125 msec, instead of 50 cm in 25 msec) which proves some of the consequences derived from the postulates of the theory of restricted relativity (See Appendix), something that was only possible because the S_S actually traveled at all times at twice the speed that the S_O was observing from a moving reference system and in restricted relativity this amounts to moving, at most, at a speed of light, which places internal time in another frame of reference.

Fig. 16. Summarizes the proposal that TL makes about internal or psychic time.

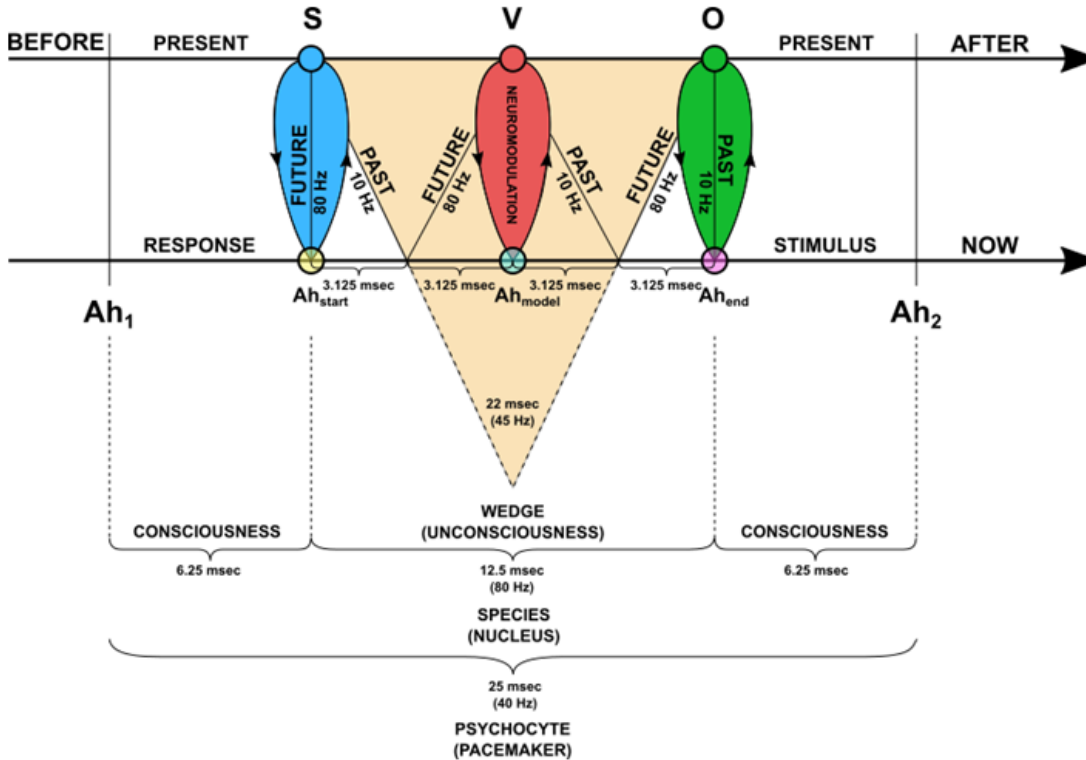


Figure 16 Internal time

As can be seen in the figure, there are two well-defined planes: the superficial or external time, represented by the axis BEFORE - AFTER and the profound or internal time axis, represented by the axis NOW. This arrangement is in full agreement with what is shown in previous figures, with the difference that here, just for reasons of clarity, the helical movement has been deployed and has become linear, therefore, the movement from before to after represents the direction of rotation dextro-rotatory.

Following Llinás (1993), periods of 25 msec duration (product of a 40 Hz oscillation) are arranged on the axis NOW, of which 12.5 msec (half) represents the time spent in rostrocaudal tracking of the cerebral cortex flow rate, for us “state of consciousness”, and 12.5 msec (the other half) representing the temporary wedge, for us, the “state of unconsciousness.”

It is thus determined an alternating behavior between states of consciousness and unconsciousness that are evident between one NOW and another (Ah1 and Ah2, respectively). This dynamic involves a kind of exploratory interruption of the state of consciousness whose purpose is to perceive and elaborate what is seen, tasks that happen during the "wedge," and to which he dedicates, part of the internal time.

All aspects of perceptual functioning during the "wedge" are plotted in the previous figure. The identification of S, V and O are done before an absolute 'obliteration' of the present (of external time - start), a situation that is verified when both cycles (superficial and deep) coincide, what we have represented in the figure with the primary and secondary colors, respectively. That is, when the white color is confirmed on the surface (sum of a primary and a secondary), the identification is certified. In each identification process the internal time cycles in reverse (it is levorotatory), slowly (10 Hz) by the ramp of the past, arriving later than on the surface to the line of the present; delay used to 'fill' in part, the "transient memory."

Having done the above, it accelerates to twice the surface frequency (at 80 Hz) to achieve two objectives: on the one hand, anticipate the future based on the “model” stored in the associative cortex, the presumed equivalent of the contraction of the path in Einstein's special relativity, preparing the appropriate PAF that will bring to the surface a response according to the perceived stimulus (end). On the other, to arrive in time to meet, superficially, with the restart of the state of

consciousness that will validate the appearance of simultaneity (relative simultaneity of Einstein) that occurs in a specific NOW within the present of external time.

The previous mechanism has been confirmed with the functioning of the thalamocortical system, which forms an integrated and reciprocal network where are included both, specific nuclei (representatives of the superficial level), as well as non-specific or reticular (representatives of the deep level).

Since 1990, Rodolfo Llinás insists on affirming that the consciousness, as the locomotion is something that has more to do with an intrinsic activity than with the senses. He proposes it as a dream simile internal functional state that is modulated rather than generated by the senses (Llinás et al., 1998, p. 1841).

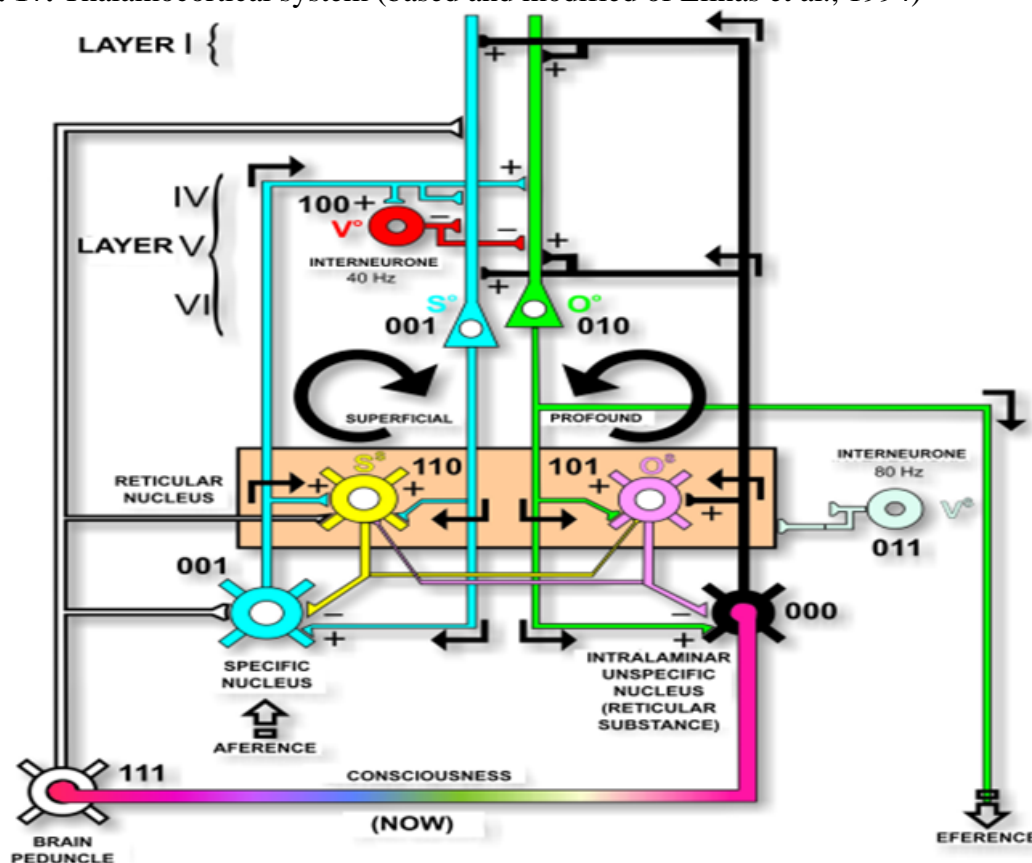
The previous statements of Llinás were based on a series of studies that were dedicated to establishing the fundamental difference between the waking state and the dream state. That is, what happened to brain function in these, so dissimilar, states of consciousness? The above is based on a very interesting hypothesis, which suggests that it is as essential detecting neuronal activity, such as its 'silence' or its apparent inactivity. To generate the essential patterns that record what is perceived, the function of the nervous system needs some neurons to discharge while others are in supposed rest, since the 'neuronal silence' does not imply *per se*, absence of participation, but is indicating, as a counterpart, the existence of this relational pattern. Llinás (1984) showed that thalamic cells observe a very particular behavior when they are at rest. That is, when they are activated, they respond almost like any other cell, but when they are inactivated, after a period of time, the thalamic neurons show a spontaneous oscillatory activity, being able to oscillate at different frequencies.

The cerebral cortex receives sensory information from the specific thalamic nuclei, but also from the non-specific thalamic nuclei; information that then comes back to them. The coordination of these entrances is fundamental to unify the perceptual act, something that is demonstrated before various injuries of both systems. Thus, when specific nuclei are injured, whose function is to bring sensory information to cortical layers III and IV, it causes a deficit that is directly related to a particular input (visual, auditory, etc.). On the other hand, if the nonspecific nuclei are injured, they cease to be aware of what is transmitted to the cortex by the specific system, despite being intact, that is, the input cannot be perceived, and therefore, responding to it. It is as if it ceases to exist cognitively speaking because the specific intact information is ignored. The nonspecific system then, allows to achieve the unification, that is to say, enables to contextualize the content of the particular entrances, officiating of "continent."

The studies carried out by Llinás and other researchers, indicated that during the cognitive tasks a coherent activity of 40 Hz is generated, and it was Llinás together with his collaborators, who demonstrated that this activity reflects the resonant properties of the thalamocortical system, which It was baptized as 'the unifying signal' (Llinás, 2003, p. 144), since it is not only involved in the primary sensory process, but also functions as a temporary conjunction that unifies the perceptual experience. On the other hand, it has also been shown that oscillations at 40 Hz are present at various levels of the CNS, such as the retina, the olfactory bulb, the reticular nucleus of the thalamus and the neocortex.

Relating the waves at 40 Hz with consciousness, make it a discontinuous phenomenon that is determined by the concurrence of thalamocortical activity. This oscillation is not only a factor of a spatial organization (coherence and resonance of large groups of neurons, even the most distant ones) but of temporal unification of their rhythmic activity. According to Llinás, this global temporal mapping generates cognitive activity, which is thus transformed into an intrinsic property of the CNS.

Fig. 17. Thalamocortical system (based and modified of Llinás et al., 1994)



References: I, IV, V, VI: layers of the cerebral cortex - (+): activation - (-): inhibition

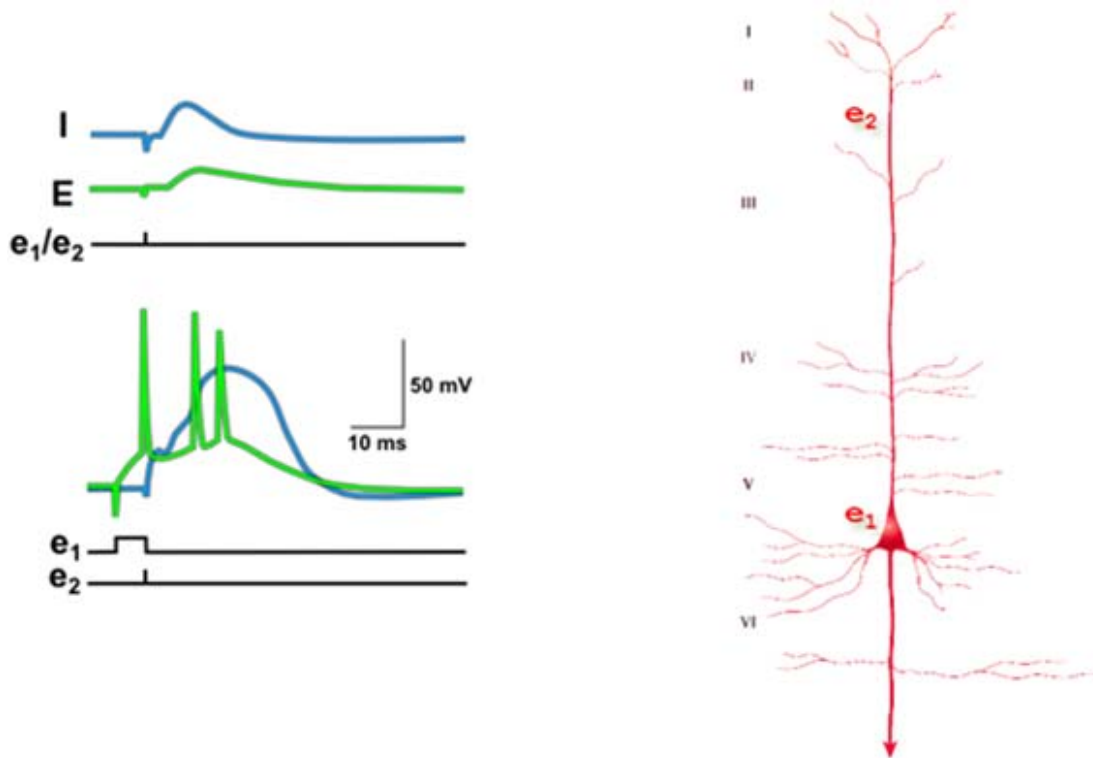
Figure 17 shows two paired circuits. First, the specific (left - blue) which is where the sensory afferent pathways (visual, auditory, etc.) reach the dorsal thalamus (evolutionarily more recent), whose neurons oscillate at 40 Hz thus establishing a cortical resonance when activated, on the one hand, directly to the pyramidal cells, and on the other, causing an anterograde inhibition through the activation of an inhibitory interneuron at 40 Hz in the layer IV of the cortex. The mentioned oscillations return to the thalamus through the collateral axons of the pyramidal cells of the layer VI of the cortex, causing a retrograde inhibition upon reaching the reticular nucleus.

Second, there is the non-specific circuit (right-green) (the oldest phylogenetically) that connects the non-specific thalamic intralaminar nuclei with layers I and V of the cerebral cortex, and with the reticular nucleus. From the V layer of the cortex, the oscillations return to the reticular nucleus and intralaminar nuclei. Here the oscillations are presented as a recursive activation in the form of “bursts” of 40 Hz, which Llinás (1993) showed are responsible for the rostrocaudal cortical activation found in magnetoencephalographic records during MOR sleep (rapid eye movements). This cortical trace that takes 12.5 milliseconds equals what Kristofferson (1984) called “cognitive quantum” and would represent the minimum time of consciousness necessary to attend to the external world.

Another mechanism shown in Figure 18 is that which refers to the simultaneous stimulation of pyramidal cells of the cortex by specific and nonspecific thalamic nuclei, what is known as “temporal unification” or what integrates the content into the context, according to the interpretation of Llinás, causing the conjunction of the perceptual experience. Or the “content” to the “continent,” determining the identity of the participant element of a real event, according to TL. According to this last interpretation, the perception as an act of apprehension of a real fact will only be complete when each and every elementary element that determines that a fact, for a subject, is real and can be found or not can be identified sense.

Llinás et al. (1994) developed a model of a theoretical circuit with which three essential aspects could be predicted: 1) the reticular neuron (which in our proposal represents part of the deep level that manages internal time) is necessary for the organization of the thalamocortical resonance, 2) the pyramidal cell behaves like a coincidence detector by simultaneity of the activity of the specific and nonspecific afferent systems, and 3) the cortical afferent pathway is fundamental to maintain the oscillatory activity.

Fig. 18. Coupled Shooting



The previous hypothesis became a concrete reality, thanks to the work carried out by Larkum and collaborators (1999), (Figure 18) with which it was shown that the almost synchronous inputs (separated by a mere 5 msec) to the proximal dendrites (e_1) and distal (e_2) of the same pyramidal neuron, causes a burst of axonal action potentials, while the entrance of the same intensity in any of the regions, alone or separated by more than 5 msec does not trigger a burst. This was also confirmed by Wackermann (2007), who defines the simultaneity thresholds (≈ 3 msec) and the temporal order (≈ 30 msec) that impose internal horizons on which perceptual or cognitive moments depend. It also makes it clear that, beyond these thresholds (very close to 5 and 25 msec, respectively, previously established), time is only a mere cognitive reconstruction, and in no way is it experienced or 'perceived.' This confirms that, while we are watching, in an "eternal sensitive present" (now), that this is our only contact with the surrounding world of chronological time.

8.0 CONCLUSION

We have shown a model that would allow us to elaborate on the question of time in our brain. This operation is in line with the contributions made by the most recent neurobiological research. The existence of a "psychic cell," the psychocyte, has been founded. This contraction is composed of 16 theoretical neurons and located in a minicolumn, in the cerebral cortex. It allows recording the operation of the CNS. Like every cell in our body, it consists of a nucleus (the *species*), and a cytoplasm (*transient memory*). The "nuclear DNA" represents the *structural memory*, with a record every 25 msec. The helical axis of the "now" of the chronological time determines the "temporal pleat," or the "instant" without apparent duration, in which the chronological time and the psychic time are brought into contact. The helical arms represent "ideas" and "fixed patterns of action"

(PAF = responses). It receives entries from the thalamus and emits exits to the lower olive and the cerebellum bark (*operative memory*). In the diagonal of the "now" records the level of awareness with which it operates.

The structure that gives our psyche an oscillating behavior is the minicolumn of the cerebral cortex. Each psychocyte registers 25 msec. Therefore, a minicolumn would have approximately a recording capacity of what happens in the surrounding world of 2 to 2.5 sec.

Psychic time is controlled by three "clocks":

- The logical unit (psychocyte core - temporary wedge) → 80 Hz
- The unit of sense (psychocyte) → 40 Hz
- The semiotic unit (4 psychocytes) → 10 Hz

The selection of the previous operating units is made by phase modulation of a carrier wave.

The dynamics of internal or psychic time that we have presented in this work depends on:

- A specific functional geometry (topological relationships between neurons).
- A synchronous temporary assembly.
- A close relationship with the psychic structure (DNA).
- It has a higher frequency than external time. On average, it is 12.5% faster.
- It has a reverse direction of rotation to the external time (counterclockwise).

The state of intermittent consciousness demonstrated by Llinás gave basis to the concept of a temporary wedge. It is the external space of time that mediates between one now and another (it lasts 12.5 msec). Manage the internal time that justifies the essential brain functions demonstrated by science. It is the temporary gap that explains why the same real fact is "seen" different from the objective than from the subjective. It allows the update of the transient memory, that which as a "buffer" retains for a few seconds what is perceived. It makes prediction possible, that is, forwarding a response when it is originated from events that have already occurred before. Also, it relates external time to internal time, which cycles continuously, but is interrupted every 25 msec. These internal time segments are divided into 12.5 msec, which the brain uses to track the cortex for organizational purposes sequentially; and 12.5 msec that belong to the "wedge." Exploratory interruptions of internal time allow us to perceive external reality and elaborate on what is perceived. Finally, during the "wedge" the identification of the elements that participate in a real event and the order in which they do it is carried out.

We have seen that the thalamocortical system is responsible for the dynamics of the states of consciousness, and, therefore, for the synchronization of the superficial and deep levels of the psychic apparatus. Consciousness, as an internal functional state, is modulated by the senses and depends on the spontaneous oscillatory activity of thalamic neurons. A 40 Hz oscillation is the unifying signal, which organizes the spatial aspect and unifies time while generating cognitive activity. In this system, there are reticular neurons that produce a resonance phenomenon that allows recruiting neuronal groups, even distant. There are pyramidal neurons that are responsible for detecting the simultaneity of the temporal aspects that give meaning to the perceived facts, and a cortical afferent pathway, which is responsible for maintaining the oscillatory activity in force. The findings reported would allow, from a scientific point of view, to develop a "psychic apparatus" to highlight its structural and functional aspects. But, on the other hand, as seen and by Einstein's proposal, we can conclude that the flow of time as we understand it would be nothing more than an illusion.

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APPENDIX

Now (Aristotle): The "now" is the continuity of time, for it links past time with future time, and it is the limit of time since it is the beginning of a time and the end of another. The "now" divides potentially, and as long as he divides, he is always different, but as long as he joins, he is always the same, as in the case of mathematical lines. Because in thought the point is not always one and the same, since when it divides it is different in each case; but while the line is one, the point is the same in all cases. So also, with the "now": in a sense, it is the potential divisor of time; in another, it is the limit and the unity of both parties. Division and unification are the same and with respect to the same, but their being is different. Considered the "now" as a divisor of time is an unrepeatable moment, the end of one part and the beginning of another, and as such always different; but, considered today, the "now" is neither an end nor a beginning, except potentially, but it is a persistent present, always the same: the actuality of "now" is not division but connection of the past and the future. The comparison with the line is partial since time can only be divided into the thought.

Basal Ganglia: A conglomerate of five gray nuclei located at the brain base. Some formed by sensory neurons, others by motor neurons, and others more, by neurons that, without being sensitive or motor, fulfill a modulating function.

Encephalon's stem or brainstem: it is formed by the midbrain (or middle brain), the annular protuberance and the spinal bulb.

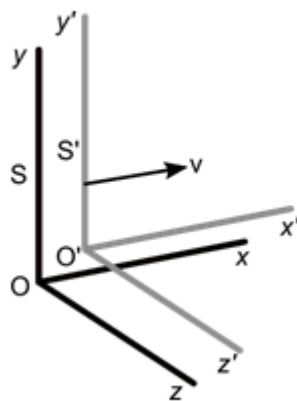
FREN: Operative Unit of the *psycho-internal system*. A denomination that comes from the Greek *phren* ($\phi\rho\eta\nu$) which among other things means mind, understanding, reason, thought, memory, attention, consciousness, sense, etc.

GEN: Operative Unit of the *bio-external system*. A denomination that obeys that this structure is the basis of inheritance and biological evolution.

Inferior Olive: Gray substance nuclear complex located at the level of the medulla oblongata (upper part of the spinal cord) that receives a multitude of sensory and motor afferents and originates the so-called climbing fibers that are distributed throughout the cerebellum to temporarily adjust the motor routines.

Limbic System: It is composed of the amygdala, thalamus, hypothalamus, pituitary gland, hippocampus, the septal area (consisting of the fornix, corpus callosum and association fibers), the orbitofrontal cortex and the cingulate gyrus. The joint function of these structures is related to emotional responses, learning, and memory. Also, hunger, sexual instincts, and our personality, our memories, and ultimately the fact of being as we are as individuals, depends largely on the limbic system.

Lorentz Transformations: In Classical Mechanics, we pass from the xyz coordinates of the fixed system (S) to the $x'y'z't'$ of the mobile system (S'), which moves with uniform translation movement in the direction of the x -axis, with velocity v , keeping the y - z axes parallel, applying the Galileo transformation (Figure). This implies the existence of a "universal time" common to the observers of both systems. If we apply the relativistic postulate of the constancy of the speed of light, to this system, the times of both observers do not coincide. Now, if we apply Lorentz transformations since the speed of light is constant and independent of the movement of the source or the observer, a "local time" is defined that depends on the respective coordinates and time. This allows reciprocally evaluating the fixed system and the mobile system.



Preterit-Future: "What was, will be." We have an answer before the future becomes present. This future is not a 'futuristic,' that is, it is not a future conditioned on cause and effect, but only on the cause, for something that happened before. We could somehow resemble it to a 'futable', because it is similar to the desirable future of Jouvenel (1967) and we say similar because here, unlike the one proposed by this French author, the desire does not necessarily originate in a questioning of the situation present, whose origin is in what was learned in the past, but because of having originated and satisfied in the past, determines the future. If something was not what it was, it surely is not what it seems to be. This is not to make 'prospective' or imagine a future; it is to predict the future to fulfill a single desire: to stay alive. It should not be confused with the tense of the anterior future that is used in French to describe an action that will be developed in the future, but that is defined as an action already completed, that is, assuming that something has happened. In the preterit-future, nothing is said of the action itself, only of the fecund past, and it is not a verbal tense. It is a vital time!

Restricted relativity: Consequences derived from the theory of restricted relativity: 1) The rest or uniform movement of a system is undetectable from the reference system itself; 2) In any reference system in motion, time passes more slowly; 3) In any reference system in motion the bodies contract in the direction of movement, and 4) The speed of light cannot be exceeded. (Excerpted from Einstein 1905).

REM: Operative Unit of the *sociocultural system*. A denomination that comes from the apocope of the Greek *rhema* ($\rho\eta\mu\alpha$), which among other things means matter, event, fact, etc.

Thalamus: Part of the encephalon located at the base of the brain formed by 80 gray nuclei where all sensory stimuli, except those from the smell that goes directly to the cortex.

Umwelt: Uexküll did not invent Umwelt. He tried to redefine the meaning of an existing term. The first record of its use comes from an ode entitled "To Napoleon." This literary piece was written in 1800, in German, by the Danish writer Jens Immanuel Baggesen (1764-1826).

*Und es verwandelt die Fluth in Feuer sich, Nebel in Nordlicht,
Regen in Strahlenguß, daß von fern erscheint der Umwelt
Ein' ätherische Feste die Schicksalshölle des Dichters.*

(And floods turn into fire, mist into northern lights,
Rain into radiant outpour, so that to the surrounding world
The poet's hellish fate appears as an ethereal castle.)

(*Afterword* in the English translation by Joseph D. O'Neil de Uexküll, 1934-2010, p. 215).