

What is Mind, What is Consciousness, and Where This Resides

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The main purpose of this paper is to respond to the questions what is mind and consciousness and where this resides. The answers are based on the frontline Informational Model of Human Body and Living Structures (IMHBLs), which shows that mind and consciousness can be described by the activity of the Informational System of the Human Body and Living Structures (ISHBLs), consisting of seven informational components, each of them with specific activity and functions, inter-correlated to support the immaterial/informational manifestation of the body expressed by mind and consciousness. The basic concept of matter-related and virtual information results as a consequence of the operability of the physics, chemistry, biologic, or mathematics laws, which actually act as informational operators, such processes are informationally driven and manifested finally as a “media-like functions” of mind and consciousness, on the “screen/display” of prefrontal cortex. The mind is therefore described as the capacity of every individual to access the data field of own life experience, where the thought acts as an informational operator, which can activate the required information from internal/external reality. Consciousness is the result of the info-representation of the explored reality, accumulated by the momentary connection, and compared/combined with the life experience, serving as judgment reference/criteria. The question is discussed in relation with the localization of consciousness, showing that this resides in the brain, as a result of the activity of ISHBLs. The discussion on the experimental evidences concerning the minimal basic components necessary and sufficient to sustain consciousness, compared with the results of the informational model, indicates the cortico-thalamus axis, in a full agreement each other. One of the basic findings is that the activation of consciousness is operated in two steps, one consisting in a feed-forward reception and another in feedback perception for recognition of the info-significance, which is fully supported by the recently reported experimental results. The phenomena of intuition, inspiration, premonition, “deja vue”, retrocausality, and intentionality are discussed. This model unifies the eastern and western concepts/models on consciousness and mind, explaining the energetic Yung/Yin Chinese model by YES/NO—informational Bit-type behavior, the Plato’s ideas/forms by “information” concept as a participating component of reality, Aristotle’s materialist view with matter structuration (assisted by information), and archaic model of the seven “chakras” at human, as vital informational centers connected with the body.

Keywords: information/matter-related information, informational model/system, info-communication, living structures, mind/body/consciousness, brain/informational centers, intuition/revelation/inspiration, premonition/intentionality retrocausation, past memory

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Introduction

“What is mind” and “What is consciousness” are two issues that have always concerned humanity, from ancient times until nowadays. Philosophy was the first science to deal with this topic, the most famous philosophical models coming from antiquity, from two different schools: that of Aristotle, who considered matter as the substrate of everything, and another from Plato, who believed that the material world is a consequence of forms and ideas, as it was recently discussed (Gaiseanu, 2021a; 2021b). Even nowadays, it is not clear if any of these models prevails, both from the philosophical perspective (Van Gulick, 2014) and from the sciences dedicated to the studies of the nervous system and of the nature of the mind and consciousness (Tononi et al., 2016), identifying the mind with the brain (Smart, 2007), or attributing to mind non-local (quantic) (Lake, 2017; Gaiseanu, 2017a; 2017b) and “universal” properties (Atmanspacher, 2020), or asking if “other mind” does exist (Avramides, 2019; Meijer & Geesink, 2017).

The philosophic or scientific literature is really abundant in proposals concerning the nature of mind and consciousness, starting from the archaic empirical models (Gaiseanu, 2019a; Radin, 2018) to more recent theories, part of them resorting to approaching the mind from the perspective of quantum mechanics (Anonymous, Wikipedia), although this is addressed to systems of particles that do not belong to wet environments, like those of living organisms (Tegmark, 2000). The studies on the scrutinizing the future and the phenomena of premonition, intuition, and communication through thought are welcome, adding experimental and theoretical evidences to the background of the problem (Radin, 2018). When the mysteries of the quantum mechanics, like the phenomenon of the action at the distance between two particles previously put in interaction (Berkovitz, 2007), are transposed to the mind behavior, these add to the mind more attractive curiosity, but however, even more mystery. Channeling is an enthusiastic proposal of connection with reality (Wahbeh, 2021), at the edge of common senses, which would develop intuition (known already to be supported and developed by the anterior (Gaiseanu, 2019a; 2019b; 2020a; 2020b) and posterior cingulate cortex (Gaiseanu, 2020c)), as a “bridge” between exotic and science, but this does not resolve the problem, only acknowledges it (Wahbeh, 2019).

In an earlier Draganescu’s view, an “informatter” agent would be necessary to structure the living systems (Draganescu, 1990; Gaiseanu, 2021a; 2021b; 2023a). The approaching activity of the human body from the informational perspective, has opened a wide and generous gate to understanding this field that is so much debated nowadays, when there is an increasingly urgent need to understand the mechanisms of brain activity and the consequences of this activity, health mental becoming one of the special/priority problems faced by the civilized world today (Gaiseanu, 2021d; 2022a). And more than that, the interpenetration with the artificial intelligence (Michio, 2014), including all the advances registered in the management by big data systems (Filip, 2020; 2021) and their compatibility with human wellbeing (Filip, 2022), or in the mimicking of the nervous system by neuromorphic systems (Liu et al., 2015) and with their involvement in ensuring public health, has become not only a recognized trend that is increasingly important, but even really necessary (Gaiseanu, 2021e; 2022a; 2022c; 2023a). Recent studies on mind models (Gaiseanu, 2020d) and pertinent strategy/model for application of mental methodology/techniques based on scientific expertise (D. H. Bennet, A. Bennet, & Turner, 2022) are addressed in this matter to large public, to improve the individual potentiality of mind (Bennet et al., 2022; Gaiseanu, 2020d; Dispenza, 2007).

Such a large range of approaches is due to the large range of mind behavioral manifestations, although each case from such a large range is subjective, so interpretable and discussible, depending on the conditions of the

experiment and on the interpretation of the observer. Therefore, the present paper is not dedicated to an exhaustive presentation of the existent literature, but rather is focused on a new concept, that of information in living structure and on matter-related information by structuration/destructuration mechanisms, to develop on this issue a new view, non-influenced of mystic or exotic concepts on mind and its behavior, but rather showing that the mechanisms of the living structures themselves generate and determine both the structuration of the body and the informational behavior, up to the creation of mind and its capability to create a virtual personal sensorial panorama of the real external world on its informational (memory) support.

That is why the approach of this subject from an informational point of view, rather little present in the specialty literature, is not only welcome, but is really necessary, in order to open the closed circle of ideas in which the current science in this field revolves, and to open thus a wide horizon of understanding of many other problems designated as such from related branches, such as psychology, behavioral and social sciences, education and therapeutic medicine. Using informational perceptions/concepts, the present paper explains in a concise but clear way the definition and role of information in the human body, its organization in informational systems, and the effect/result of their activity in the perception of reality through mind and consciousness.

Information in Human and in the Body of the Living Structures

According to recent researches, consciousness at human is a result of the informational processes in the body (Gaiseanu, 2021a; 2021b), explaining the mind-body relation, an historical question unsolved by philosophers and scientists since centuries or more (Gaiseanu, 2021c; 2023a). The scientific community accepts in general that the physics and chemistry laws act in the biological structures, but these laws are not sufficient to explain their functioning. In some recent papers, it was shown that this is because no a fundamental component of our word reality was taken into account: information. Focusing especially in matter in its various forms of manifestation (solid, fluid, plasma), information passed unobservable. That is also because this issue was not carefully approached by science, and only the relative recent development of the communication at distance revealed its importance. Nowadays, when information floods our lives in private and professional activities and is an evident and already common concept to evaluate our “hungry” of knowledge, information should become also recognizable not only as an indispensable agent of communication, but also as an active participant to structuration and functions of our world (Gaiseanu, 2021b), and especially of our body structuration and functions (Gaiseanu, 2021a) and more than that, of the body and functions of all living structures, on the entire scale of evolution and organization (Gaiseanu, 2023b).

Our word is composed by particles. In a simple approach, from a physics or chemistry perspective, an interaction between two particles A and B can be simply described by the schematic relation $A+B \Leftrightarrow (AB)$, where the physics or chemistry laws determine this interaction, consisting in aggregation or desegregation of the (AB) compound. Such a simple/simplistic view hides however the fundamental role of information in a system of particles. In such a system, a configuration or a reconfiguration could have an important, sometimes determinant role for other subsystems, for which such a reconfiguration can be interpreted as a message of change, determining further reconfiguration or a cascade of reconfiguration, as it happens in a simple living cell (Gaiseanu, 2020g; 2023a). Therefore, defining the concept of matter-related information, it is to observe actually that the matter structuration/destructuration is an information-assisted process, in which information is absorbed/released respectively, according this time to the INFORMATIONAL schematic relation:

$$(A+B)+I \Leftrightarrow (AB)(I) \quad (1)$$

where (I) is a hidden (incorporated/“embodied”) information I in the compound (AB) formed during the structuration action (\Rightarrow) by an “operator” (a physics, chemistry, biologic, mathematics law) between the matter components A and B, which can be released by a reverse-type reaction (\Leftarrow) (Gaiseanu, 2021a; 2021f). Information is thus an indispensable component of reality/universe of non-living/living structure, within the so defined Universal Triangle of Reality (UTR) (Gaiseanu, 2021a; 2021b). From such a reality, to recognize our own construction of our bodies and our functions is only one step, as it will be shown below. To point out shortly the result of this reality, we have to note that the manifestation of the living bodies, as systems capable to receive, process, and release information and functions, is just informational. And looking back to the ancient philosophies, we may note that on such a way, the Plato’s ideas/forms correspond with “information” concept, Aristotle’s materialist view with matter, and the archaic Yung/Yin energy model not only with energy, but also with a YES/NO Bit-type informational relation in universe. Moreover, the archaic model of “chakras” would correspond with the components’ activity of the informational model shortly presented below.

According thus to the above discussion, the multitude of the physics/chemistry/biologic reactions between the material components in the living structures are therefore informational processes, absorbing and/or releasing information, which operate within the so defined/revealed Informational System of the Human Body (ISHB), consisting in seven informational components, which operate also in the smallest unit of life—eukaryotic cell, composing the plants and animals, with similar organelles like human, as well as in prokaryotic (independent cell—bacterium, without well-defined organelles but with the same functions), as explained below (Gaiseanu, 2020g; 2022d; 2023b).

CASI (center of acquisition and storing of information) manages the sensorial network (info-input) and memory, connected with the prefrontal cortex (short-term memory), hippocampus (long-term memory), with cerebellum for motor-combined learned stereotypes and with thalamus, as a sensory distributor hub, essential for awareness and consciousness state (Figure 1). In eukaryotic (animals and plants) cell, CASI is represented first of all by the surface receptors, binding only the specialized ligands (informational agents with complementary structure) in a YES/NO (Bit-type) informational manner, and secondly, by the corresponding typical pathway to the genetic/epigenetic structure of the cell, where the informational reaction cascade initiated at the surface receptors can intervene to activate/memorize (YES) further information, or inhibit (NO) it (Figure 1).

CDC (the center of decision and command) manages the decision process especially in the cortex at human/mammalian and brain in subhuman animal organisms, and within the pathway network in the cytosol of the eukaryotic cell, transmitting a reactive response to the external environment (info-output) (Figure 1), expressed by motor-action/posture, and at human especially by vocalization.

IES (info-emotional system) at human/mammalian is connected with the limbic system (hippocampus, amygdala, hypothalamus) (Figure 1) and with heart—the sensitive driving distributor of the nutrient fluid to every component/cell of the body, according to the permanent and momentary needs. In cells and in inferior organisms on the organizational/evolution scale, this system is equivalent with an info-reactive sentient system (IRSS), which is perceived as a sensation/sentience effect of the received/processed information. Such an emotional/affective/sentient process is manifested typically by spontaneous reactive movement, and evaluated in the individual organism as GOOD/BAD, with an acceptance (YES) or rejection (NO) effect, depending on the nature of information, according to the species and individual experience.

MIS (maintenance informational system) manages the metabolic processes within the matter-related metabolic circuit/pathway in animals/cells respectively, generating energy (E) from adenosine triphosphate (ATP)

(basically obtained from glucose and oxygen-assisted processes (Figure 1) in eukaryotic cell), and micro-components (minerals, proteins, fat, amino acids, etc.) for the structuration/restructuration of the body. In human/animals, the MIS circuit (provided with input/output orifices/pores terminals in multicellular/unicellular organisms respectively), is connected with the brainstem and digestive system and with the corresponding organelles in cells, i.e. lung-like mitochondria, stomach-like vacuoles, endoplasmic reticulum, and lysosomes, working like pancreas and spleen for elimination of the degraded products, Golgi apparatus, as a heart-like blood vessels distributor of fluids in the cell body (Gaiseanu, 2020g; 2023b) (Figure 1).

GTS (genetic transmission system) is connected with sexual organs in animals, assuring the reproduction. In cell this is driven basically by the replication process of the deoxyribonucleic acid (DNA) molecule of the nucleus, which initiates the cellular division and reproduction (Figure 1);

IGG (info-genetic generator) is connected basically with hypothalamus and hypophysis in human/mammalian, and drives the growth, structuration/restructuration processes, and the defense of the organism (immune system shown schematically in Figure 1 right side), composed by mobile cells generated in the marrow bones, and distributed by blood and lymphatic fluid through the immobile structures, consisting in blood/lymph vessels and their nodes (cell stations), spleen, thymus, and special singular organs like adenoids, tonsils, and appendix, which defend the entrance gates to the organism of the pathogens in cells. IGG is represented basically in cell by transcription-translation processes for the production of proteins, the bricks of the body, operating by informational mechanisms according to the foreword informational relation (1), which consists in the copy of various sequences of DNA in “four-letter alphabet” of the nucleotides by mRNA (messenger RNA), the transposition in a new language in ribosomes by tRNA (transport RNA), and combined with some of the 20 amino acids components in cytoplasm (Gaiseanu, 2020g; 2023b).

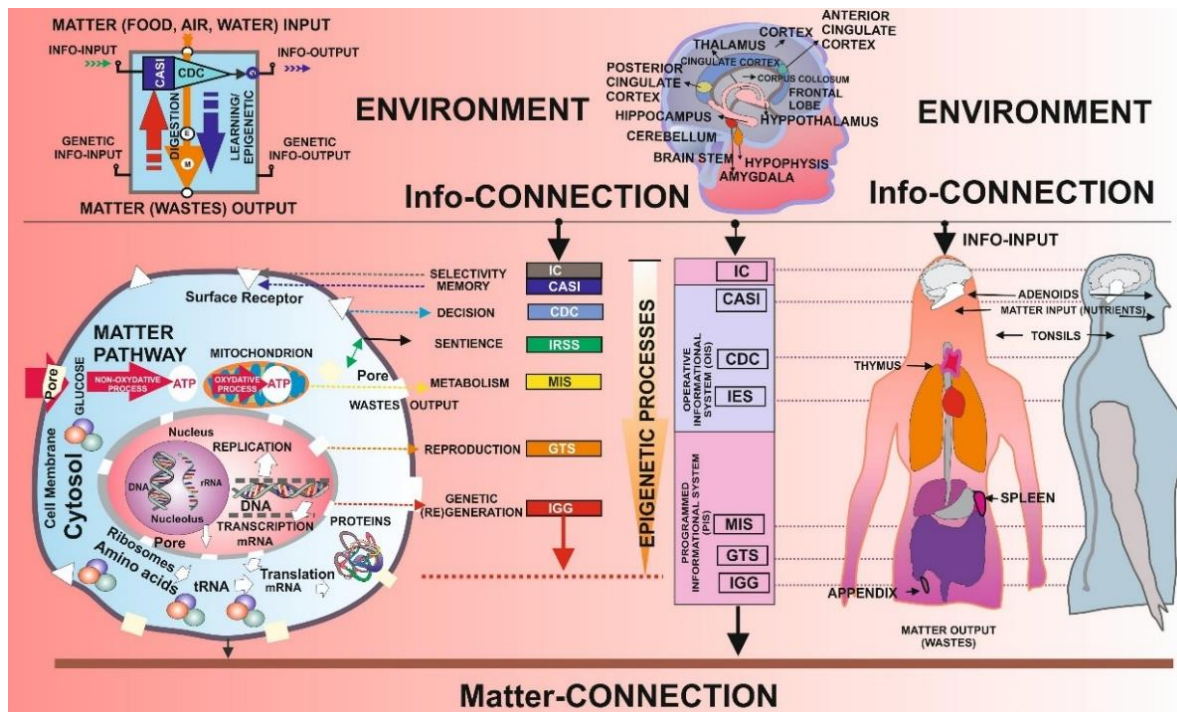


Figure 1. Schematic representation of the informational (cognition) system of human (right side) and living (eukaryotic) cell (left-down side of the figure). In the upper-left side, a schematic representation of organism functioning is shown, like that of a “device”.

IC (info-connection) system is the most subtle component of ISHBLS, with not so evident, but fundamental function for the correct functioning of the organism, probably the most relevant evidence shown by the operability of the immune system. This system maintains basically the received signals through a permitted informational “window” between the limits of a suitable range, according to the inherited/acquired experience, allowing the correct/non-deviated operation from the attributed tasks of a cell. At human, this is experimentally evidenced by an EEG (electro-encephalography) error signal in the anterior cingulate cortex before a decision, warning on such a deviation, and manifested by a spontaneous evaluation in social relations or problem resolution, and at animals by a correct individual/collective orientation during the migration of the birds, anticipation of a danger or bad weather, synchronized behavior of the school of fishes or of bacteria colonies (Gaiseanu, 2023b; 2023c). IC is involved in the (YES/NO) selection of trustworthy-related states (certainty) vs. the non-trust alternatives (uncertainty), as an informational selector/warner for stable and sure “navigation” in life between the unknown events, in extra-corporal and NDEs experiences (Gaiseanu, 2019c), Religious and Mystic Experiences (RMEs) (Gaiseanu, 2019c) and in any forms of scrutinizing the future (Gaiseanu, 2017b), based on the activity of the posterior cingulate cortex. This brain region determines an automatic disconnection from external reality and the involvement (by mind “eye”—the prefrontal cortex) in daydreaming experiences, scrutinizing the internal world and future perspectives by planning and projects design (Gaiseanu, 2023b). Within this process, the inherited and adopted habits and mentality serve as judgment criteria. In cell, IC is operative even from the info-input reception of the signal by a specific, firm selection (YES/NO) of a specific signal at the surface receptors and after, according to the inherited or epigenetically supported goals, and by the associate network in cytoplasm, assuring the regular, right functioning of a cell, in agreement with the particular specific tasks within the local/general micro/macro-scale body context, as it will be further discussed below in the case of the immune system.

With these components, it is therefore possible to define the Information System of the Human Body and Living Structures (ISHBLS) as a contribution of all specified systems described above, as follows:

$$\text{ISHBLS} = (\text{CASI} + \text{CDC} + \text{IES} / \text{IRSS}) + (\text{MIS} + \text{GTS} + \text{IGG}) + \text{IC} \quad (2)$$

where (CASI+CDC+IES/IRSS)=OIS (Operative Informational System for operative adaptation to the environment cues) and (MIS+GTS+IGG)=PIS (Programmed Informational System) for maintenance/structuration of the body and species survival by intergenerational (==>) transfer of information (GTS ==> IGG).

Relation (1) shows that the activity of the micro-components of the body (molecules, organic micro-components) can determine the functionality and structuration of the macro-components of the body in the multicellular organisms, operating with information. In terms of information, the connection with the external/internal reality is operated by OIS, able to detect information by means of the sensorial network (info-input in Figure 1 upper-left side) and interpret them for further reaction (info-output), functioning as a software for adaptation. This activity is overlapped on the automatic informational activity of the “hardware” support (body), which provides energy and necessary nutrients for the (re)construction of the organism. This informational living “device” is able to learn during life experiences by epigenetic processes, as shown in the upper-left side of Figure 1 by a big blue arrow.

A remarkable accomplishment of IMHBLS is showing that the “hardware” (the constructive components of the body supporting PIS functioning) of the living structures is practically the same on the entire living scale of evolution/organization, working on the bases of the same informational “scheme”, following the same functioning principles, independently on the shape of a certain organism or species, and that OIS is an operative

component of ISHBLS assuring/operating the adaptive reaction (attitude/info-output) corresponding to the informational input. The “core” component of these systems is the extremely large molecules of DNA, organized in the genes of the genome, which contains the full necessary information to construct/structure the body and its functions of each species, based on the generation of its very large family of the organic components and their structuration/organization, driven by the forward (\Rightarrow) informational relation (1). This is a wonderful miracle of life, driven by INFORMATION!

The experimental evidences supporting the IMHBLS on the entire evolutionary/organization scale were recently discussed in detail (Gaiseanu, 2023b). One of the most relevant examples refers to bacterium as a simplest unicellular organism and another to the immune system in the multicellular human/mammalian organisms.

As it was shown in detail recently (Gaiseanu, 2023b), wherever/anywise examined, the specific components of the ISHBLS, could be discovered even at the smallest “simple” prokaryotic living cells. The experimental evidences (Jacob, Shapira, & Tauber, 2006; Shapiro, 2021) support the informational model on the entire range of living organisms, from virus, which is a sub-living category (Gaiseanu, 2022c), bacteria, which are unicellular independent organisms with non-sharp evident organelles but with the same functions, eukaryotic cell as a basic composing unit of the plants and animals multicellular organisms, which operates by means of a well-defined system of organelles, as it is represented in the left side of Figure 1. Although considered a very simple organism—actually the simplest, bacterium shows a sophisticated system of info-operability, capable of intercellular/intracellular info-communication/coordination, demonstrating that all living cells are cognitive systems (Shapiro, 2021). Indeed, studies on bacteria, show that the bacterial info-transduction systems—OIS according to IMHBLS, are responsible for sensing (CASI/ISRR) the environmental cues (info input) and for adjusting (CDC) the cellular behavior (IGG/GTS) and/or metabolism (MIS), monitoring their intracellular/cytoplasm/membrane conditions to counteract adverse changes (Galperin, 2018). The sensorial network (CASI) activated for the surveillance of the external/internal status, managed by the cell genome in nucleus to Info-structure of proteins according to the forward rel. (1), could be even characterized by a “bacterial IQ” (intelligence quotient) (Galperin, Higdon, & Kolker, 2010), a factor introduced just to express the complexity of the signal transduction components encoded in a given organism, even at the most primitive bacterial cells, and their adaptation capabilities (Gaiseanu, 2023b). Experimental evidences at animals (Gaiseanu, 2023b) and even plants, although without a nervous system (Gaiseanu, 2022e; 2022f), show an informational activity according to the IMHBLS. Therefore, according to recent results compared with the predictions of IMHBLS, despite certain mechanistic differences, on the entire complexity/organization scale, the sensory “logics” of humans’ cells, which encode more than 600 protein kinases (which are enzymes acting as a YES (active) vs. NO (inactive) switch, according to IMHBLS), and about 800 G-protein-coupled receptors—while bacteria have far fewer signaling proteins—show relevant parallels (Shapiro, 2021; Gaiseanu, 2023b).

What Is Mind and What Is Consciousness

At human, the cognitive-sentience exploration of the reality is the result of the transduced info-activity of the components of ISHB on the “media-like display”—the prefrontal cortex, by means of the corresponding cognition centers, composing the individual self (I), as follows:

$I = I_{\text{know}} (\text{memory}=\text{info-input}=\text{life experience}) + I_{\text{want}} (\text{decision}=\text{attitude}=\text{info-output}, \text{depending on the contributions of all other cognitive centers}) + I_{\text{love}} (\text{emotions}) + I_{\text{am}} (\text{health, vivacity, power}) + I_{\text{create}}$

(biological creation/sociality=genetic info-output) + Icreated (inherited predispositions/abilities=genetic info-input) + Ibelieve (trust/confidence/reliable experience) (3)

At human, the interpretation of reality is expressed by words and vocabulary (Gaiseanu, 2021g), but various other species can communicate by specific tools and signals (vocalization, sonic/visual/chemical signals, posture, etc.) (Gaiseanu, 2022g). The living structures “work” therefore like informational “devices” with two info-inputs and two info-outputs, as represented schematically in Figure 1 left-upper side.

As it can be deduced from IMHBLS, memory is a fundamental mental system which accumulates the life experience, allowing the CDC access for comparative analysis and decision. Memory contains not only the “video clips” of the life experiences, but also the associated emotions. Hippocampus is used in fact by memory and also by emotion. The main players of the mind are thus the memory, decision making, emotions, as a reaction to information (OIS), with the automatic intervention of info-connection, as relation (3) shows. Therefore, according to this informational model, the mind is defined as the result of capacity of every individual to have access to the data “field” of the life experience, where the thought is the informational operator, which can activate in every moment of the connection with external and/or internal reality, the required information. Consciousness is the resulted info-representation of the explored reality, accumulated by the momentary connection to reality and compared/combined with the life experience, serving as judgment reference/criteria. To operate, this system needs energy, provided by MIS, so if no energy, no operations, no connectivity (CASI/IES(IRSS)), and no mind/consciousness. Within PIS, IGG assures the maintenance of the integrity of organism, and the development according to the age, and GTS, the continuity/survival of the species. Within the development process, cellular GTS/IGG work together for the growth and maintenance of the body.

The vision circuits—the most developed at human—are practically the same (Kosslyn, Ganis, & Thompson, 2001; Østbya et al., 2012) during the external or internal exploration of reality. This is operated by the internal “mind eye”, by the switching from external to internal world executed by the posterior cingulate cortex, which is the switcher from one to other, so a simultaneous connection is not possible. The posterior cingulate cortex (PCC) is therefore a high consumer of energy, even during the resting state, as it was explained recently (Gaiseanu, 2020c). The so-called “mind eye” is practically the prefrontal cortex, where the recall information from memory or imagination (Gaiseanu, 2021g) is projected. Imagination is a mental process supported by PCC, consisting in the building of new information from the existent mixed information, in which fantasy and creativity plays a primordial role. Imagination is a fertilizing process for inspiration in arts, scientific investigation research, and design engineering or architecture, or in the intelligence services, mind operating at the border between certainty and uncertainty (Gaiseanu, 2019a; 2021g). Innovation and creativity are inestimable native inherited and proactive characteristics of each of us, if we learn to hear the “silent voice” of our aptitudes, inclinations, and abilities, operated by IGG (Gaiseanu, 2019d), leading the personal trajectory to success and fulfillment, both in career and private life (Gaiseanu, 2023d).

However, a fitting with reality is necessary to be maintained permanently for a healthy equilibrium. If not, so if imagination becomes more trustworthy than reality itself, that is a dangerous way to the disability of connection with reality, and for entering in the territory of mood disorders (Gaiseanu, 2021d) and/or aggressiveness states (Gaiseanu, 2021h). These are induced by the produced “discomfort” between imagined and real world (Gaiseanu, 2021i), with grave consequences for the personal life, for the life of the people around, and also for the society. The addiction to alcohol and drugs, in search of a phantasmagorical world, broken from reality, does not solve this situation, but aggravates it (Gaiseanu, 2022a). The careful selection of the “ingested”

information before the “metabolic” (epigenetic/info-integration) process itself, is as well important like the selection of the healthy aliments necessary for the body maintenance.

What we call usually “consciousness” is proper to human, and even so, each person A or B disposes of his/her consciousness (Ia \neq Ib). However, as it was shown recently (Gaiseanu, 2022g) there are various forms and capacities of knowledge (“consciousness”) for exploration of reality in the living world, peculiar to each species, depending on the sensorial and info-processing “tools”, which each species/exemplar is endowed with, and on the complexity degree on the evolution/organization scale, even some of them do not dispose of a nervous system (plants, bacteria) (Gaiseanu, 2022e; 2022f). The question of “consciousness” is therefore a much larger and much varied issue, and cannot be limited only to human, who is actually part of the living universal system.

The complementarity (YES/NO) in the structuring and functioning of the human body (Gaiseanu, 2023a; 2023b) is effective at the microscopic and macroscopic scale, used as a means of info-transmission/communication through the specific ligand/cell surface receptor relationship (Alberts et al., 2015), going at the macroscopic level to the morphological complementarity of sexes, as well as to their specific manifestation mode. This is manifested actually as a general universal YES/NO informational mechanism in living nature, and not only in this, as an informational expression of the old Chinese concept of the two opposite and complementary manifestations/components, the Yin/Yang principles (Gaiseanu, 2021a). At the heart of the informational genetic system, the pairing and structuring/restructuring rules are based on the same inexorable principles: DNA nucleotides are associated by complementarity, A only with T and G only with C. DNA is made up of four building units called nucleotides: adenine (A), thymine (T), guanine (G), and cytosine (C). Life itself is based on the activation/deactivation (YES/NO) on the time scales of genes of the cell genome (which is the stable, genetic memory), as in a superb “musical” organ recital in which each component is “sound”, alone or in a group, as a result of the activation of the composing musical tubes/cords. The behavior as well as the structuring of the human body is the wonderful results of this wonderful symphonic “concert”, imperceptible to our direct senses, but obvious and visible on a macroscopic structural and behavioral level. One of the simplest and basic examples is the complementary morphology and behavior of the sexes, and in a deeper scale between the complementarity of the opposite (YES/NO) excitatory/inhibitory effect of the neurotransmitters in the nervous system, assuring the equilibrium of the whole.

Information received in CASI, felt by IES, and processed by IC/CDC in the brain circuits, is transduced correspondingly both at the input sensorial level and at the output “device”—the prefrontal cortex, which is the display terminal of mind and consciousness, as it is shown below.

Where Consciousness Resides

One of the most frequently evoked questions is where consciousness is actually located (Walling, 2000). The development of non-invasive tools like functional magnetic resonance imaging (fMRI) and variants (Anonymous, Wikipedia) assisted by computer calculations, allowed and allows the investigation of the dynamic activity of the brain during its working, showing the inter-correlations of parts of it during the thinking/info-activity processes, on the basis of the evaluation of the oxygen content transported by blood, indispensable for energy productions (MIS) in the (neuronal) cell (matter pathway in Figure 1). Some recent investigations (Tononi et al., 2016) show that consciousness in human (by extension to mammals) is very probable to reside in/to be the result of the cortical-thalamus interoperability (Kitazono et al., 2022).

So, as it was recently shown (Anonymous, 2022), the response to such a question, since longtime ago present on the working table of the researchers, is already ongoing to be given. The vision circuits include thalamus and occipital brain, and the vision is based rather on the differentiation of the light contrast on an image, than on the color (BrainFacts/Sfn, 2016). Various observations on the visual perception (Leopold, 2012) supported by experimental evidences, taken as a starting point for further investigations, are suggesting that consciousness is activated not in a single unique step, but necessarily in two distinct steps (Kitazono et al., 2022): one of it is a primary feed-forward step of perception in the prefrontal cortex, followed by a second feedback step for a full understanding of reality. For this finding, it was taken into account the mechanism/pathway dynamics of the visual sense, very well developed at human and subhuman animals, occupying more than 50% of cortex (the external thin cerebral layer of the brain), demonstrating that a correct perception of an image is processed actually by a bidirectional pathway neural networks, involving basically the activation of the prefrontal cortex and the occipital zone of the brain, within a feed-forward/feedback bidirectional process. Thalamus, located in a strategic position in the central zone of the brain, administrating the flowing streams of information to and from the frontal cortex and sensorial networks, plays a fundamental role in the integration of the information, so this would be an imprescriptible component of the brain in activating/deactivating consciousness.

Experimental researches based on observations of the recovery process after sleep, anesthesia, vegetative states, or nervous derangements (Tononi et al, 2016), support such investigation strategy. Indeed thalamus, explored by neuroimaging and other noninvasive methods, shows a massive innervation from cortex, and may act as a switcher of consciousness. The animal models of anesthesia are mostly driven by cortico-thalamic feedback, and coma is typically caused by a suppression of cortico-thalamiswitcc function by drugs, toxins, or internal metabolic derangements (Tononi et al., 2016). Actually, the most consistent effect produced by most anesthetics, is a reduction of thalamic metabolism and blood flow (so of its activity), which involves subsequently the corresponding reduction of the activity of many cortical regions. Moreover, isolated paramedian thalamic damages cause persistent unconsciousness, and the recovery from an unresponsive wakefulness syndrome is associated with the restoration of functional connectivity between thalamic nuclei and prefrontal and anterior cingulate cortices (Tononi et al., 2016). Concerning the discussion on the “minimally sufficient and jointly necessary” brain subsystem to sustain consciousness, it is undisputed, and certainly accepted, that broad lesions or inactivation of the cortico-thalamic systems abolish consciousness, whereas lesions of other parts of the brain do not (Tononi et al., 2016). So, in other words, what is important to note is that the experimental evidences show that consciousness is minimally based on the functioning of thalamus and connected cortical regions.

The two-step dynamics of the nervous system in brain to sustain the mind operability and consciousness discussed above, were already predicted by the Information Model of Consciousness (IMC (Gaiseanu, 2019b; 2021g) – part of IMHBLs), based on the analysis of the functions of various constituents of the brain and their automatic response to the perception. Indeed, in a recent article, it was shown that the full perception of information in the brain should follow two steps, within two info-brain interfaces: one dedicated to the perception of “raw” (primary/not yet “decoded” signal) information, and another one dedicated to the comparison with the field of the existing data (memorized experience of life) for the acknowledgment/recognition of the attributed significance of the received “raw” information, in a fitting comparative process (Gaiseanu, 2021g). This step or immediately ulterior step, is also dedicated to the recognition by language/words and the conceptual signification of information, according to the used “dictionary”, stocked also in memory. The word recognition interface stipulated by the informational model (Gaiseanu, 2021g) was recently found to consist in two networks, one of

them for words/vocabulary recognition, during a rapid progressive activation of a network of the frontal lobe, and another one to activate a network in the temporal lobe, for the integration of the meaning of a certain sentence during the reading (Barkley, 2023), both of them interchanging information (Woolnough, Donos, Murphy, & Tandon, 2023).

The second step is actually demonstrated by the activity of amygdala, surveying the discrimination between dangerous and non-risky significance of the “and” received information, which is an automatic/spontaneously process. Secondly, this is also demonstrated by the automatic activation of the anterior cingulate cortex, as a discernment adviser/counselor on the reaction, which should be followed according to the trusting/checked information accumulated as a life experience. The role of the posterior cingulate cortex highlighted in the experimental results was already pointed out within IMHBLs in a previous publication (Gaiseanu, 2020c), as it was discussed above.

Conscious revelation of the (“raw”—primary) received feed-forward information is therefore fully perceived as significance in the second step, consisting in a comparison with the existing memorized/reference/“decoded” data, serving for recognition. Within this step, the thought—which is the informational operator of the mind on the informational field of memory data, allowing the access to them by the intervention of the cortex CDC, is also automatically activated. Consequently, the thought is an imprescriptible component of mind, necessary to activate the “light lamp” and states of consciousness. This second step is thus for identification and recognition of information. We can distinguish in a first rough analysis two kinds of memorized data: shallow memories, commonly and currently used, and deep memories, registered but not frequently used, maybe even “forgotten”, out of using since long time. Therefore, we can define “deep consciousness” as being related to the memorized data, which are far away from the recent or intensive access, out from the current use (so apparently “forgotten”), but still active in the unconscious range. Such data can contribute to the spontaneous “revelation” phenomena, which apparently have no “logic” relation with the present (conscious) informational sources. Intuition is also a phenomenon belonging to the same category of comparative/contributive running process.

Premonition is a phenomenon beneficiary of a similar process, if the spontaneously analysis of an expected situation seems to be similar or associated with already past experiences. In premonition, the role of amygdala, sensitive to danger and alarm information, could be predominant. However, the conversion of the current life in such a fatalist repetitive type of “premonition”, distorts the spontaneous natural role of such a phenomenon, leading to anxiety. Depression, induced by lack of objectives/projects and trust (IC), and anxiety (supper-excitability of IES and wrongly “educated” IC/Ibelieve), are the illnesses/dysfunctions of our informational century, coming, among other causes, from the incorrect use of information. Depression can also be a consequence of an intense/dramatic mental “living” in the past, with endless regrets of a decision different from the one which at present would be taken, producing a complete disconnection of the center IC from the present reality, which should be actually accepted as such. Living only in the past, ruins the present and buries the future.

The promoters (Iknow(?)/Ibelieve(?)/Iwant), pretending to transmit/offer (=>) various methods of “scientific” super-channeling or other super-connecting techniques of the mind, promising “miraculous” connections with existing or non-existent after-life or living entities, personages, or situations, should actually really know first of all, that this is a risky game with the mental health of the people, by abusive or not adequate, detrimental practices. And the people who fall prey (<=) to such “magical” practices/information, believing in them (Ibelieve(?)), as well. The “tuning” of IC to connect useful, compatible information, is therefore necessary

not only for a good health, but also for a right and successful trajectory in life (Gaiseanu, 2023d). The renovation of the system of thinking is also necessary, to abandon the obsolete information, which don't correspond already with reality, so to adapt also to the decision criteria in reality (Gaiseanu, 2023d; 2020d).

The “deep” memory is also a source of the inspiration phenomena: this can rise actually from a set of concerted deep information, seeming to be a “miraculous” solution activated by a present issue/objective. That is because the inspiration without practice and deep preparation of mind in the searching domain, cannot appear. The posterior cingulate cortex, with high activity (not yet understood until recent published result) (Gaiseanu, 2020c), is an important contributor to exercise these phenomena, initiating/activating the inner introspection word, the future planning projects, and the analysis/surveillance of the internal word (the accumulated experience), to scrutinize the search of solutions. In terms of IMC, such type of activities enters is the competence of IC, which should belong therefore to the supporting components of consciousness, even to the minimal one, because these processes are automatic. The sensation of “déjà vu” (already view previously images), classified as a “strange” phenomenon, enters also in the same category of deep “forgotten” information.

Following this line of analysis, we have to recognize again the important, not at all negligible role of predilections and predispositions, coming from the acquired information by the ancestors and projected in mind by IGG. This is not at all amazing, although it seems to be as such. A long time ago, the question of the children who relate about their last life was neglected by sciences, probable because no reasonable/current common sense explication for this phenomenon could be offered, so this was ignored or forgotten for a time. However, the repetitive relating cases (Haraldsson & Abu-Izzedin, 2012), determined the approaching of this delicate issue. In the lack of other explicative mechanisms, such a phenomenon is attributed to mental dysfunctions, treated as a general cause (Brewin, 2012). That is because a possible causation coming from the native genetic memory of the organism is not taken into account, as the informational model of the human body and living structures (IMHBLS) may admit. According to the presentation above, IGG is responsible both for the body generation and the behavior manifestation of the mind, by the alternative/appropriate activation/deactivation of genes of genome, which expresses therefore the distinctive characteristics of individuals over that of the species. The prolongation of the debate for instance on the nurture (training) vs. nature (genetic inheritance) dilemma in psychology (Gaiseanu, 2019d) is a consequence of such a situation. As it is shown by IMHBLS, succinctly presented above, the power of information and of the info-genetic generator (IGG) is really amazing. The growth of a new human being, starting from a fertilized “zip”-type egg (a cellular unit), is really spectacular (Gaiseanu, 2021e; 2022c; 2023a). Such an info-reproduction according to a “blueprinting” design enclosed in the genome, starting from a “zip”-type germinating unit and developed on the basis of matter-related driving processes, is not only amazing and admirable, but very precise (Gaiseanu, 2022g). The incredible precision should be therefore transferred when the traits and behavior are concerned, which are also related by the concerted functionality of the genetic “pipe organ”, as it was mentioned above. A “deep” (genetic) past memory therefore could be also associated with the described phenomenon, coming from the previous generations. At the two main categories of memory—the shallow and deep memory, coming from the personal/individual acquirement, we can add also therefore the deepest—genetic memory, coming from the previous generations.

The future influences the present, or retrocausality, which can be considered as a part of intentionality-related phenomena, was recently also discussed (Gaiseanu, 2020d), arising from quantum mechanic experiments on retro-causal effect (Friederich & Evens, 2019). In such recent studies, it is shown that the particles participating in a quantic experiment seem to “anticipate” a priori the intention of the experimenter to measure the particle

system, i.e. the implied particles would “guess” this intention, like the time would flow in this case in a reverse sense (Popescu, 2013). This was explained by a so-called Two-State Vector Formalism (Yakir et al., 1964)—a sophisticated physics/mathematic formalism. In terms of IMHBLs, it was suggested that such a behavior would be a consequence of a matter/anti-matter particle system, with opposite time axes, taking into account that in vacuum, both types of particles are generated, as well as in universe (Gaiseanu, 2019c). This retro-causal behavior and the “two-state vector” modeling “formalism” is however still a controversial issue (Friederich & Evens, 2019), even this is attractive from the point of view of mind behavior and its extra-sensorial capabilities (Gaiseanu, 2017b).

Based on the similar organization of the informational system on the entire evolution scale revealed by IMHBLs, the extension of the results discussed above to other biological species could be immediate. The question therefore if other subhuman species could have mind and consciousness is undoubtedly affirmative. This issue was actually discussed in more details in a recently published paper (Gaiseanu, 2022g), where the relations between body and information were described, similarly with the relation mind-body in human, an ancient debated problem in philosophy and other interested sciences. According to IMHBLs, a basic conclusion is that the living matter itself and the dynamics of micro-components create (rel. (1)) both the micro-circuits and informational streams by which the information is carried out from receiving external or internal sensors—specialized micro-components sensitive to information, toward the memory (CASI), by a dynamic process of comparison and selection (IC), analysis and decision (CDC), inherently felt by the sensitive/sentient system as IES/IRSS, for an output adaptive response (attitude). This is like, but NOT IDENTICAL, with the activity of an informational device (Gaiseanu, 2021j; 2021k). The high complexity and organization degree of the living structures is not yet attained by the artificial intelligence, even with the most modern new generation of artificial deep neural networks, used, among other applications, in the automatic driverless cars, responsible to make dynamic momentary and optimal decisions under a very high complexity of traffic (Gaiseanu, 2023c). To have an idea on such a difference of magnitude, we can refer to the spectacular and relevant informational activity of the immune system, managed by the brain support of IGG (the axis hypophysis-hypothalamus), based on the info-communication with the individual local “fighters” against the undesired intruders—the immune (white) cells, distributed within the whole body, which follow their tasks according to such a coherent communication with the brain, with themselves, and with the immune cell collectivity (Gaiseanu, 2023c). As it was recently shown (Gaiseanu, 2023c; Irun & Sol, 2019), even if the natural and artificial systems are completely different, the degree of complexity could be evaluated comparatively, taking into account that such a deeper learning machine can work at present with about 150 millions of parameters, while the natural system with even more degree, knowing that a milliliter of blood contains about 2 million T cells (a sort of immune cell) (Gaiseanu, 2022b; 2023c), and each T cell expresses tens of thousands of proteins on its surface, exhibiting thus orders of magnitude more complexity than the most developed present learning machine (Irun & Sol, 2019). One of reasons is the high abilities and performance of the living organisms to reconfigure/(re)structure themselves according to the momentary necessities (rel. (1)), assisted by DNA=>Proteins processing machinery to produce a large variety of organic components with a large variety of characteristics and combinations, sensitive to small variations of temperature and local conditions (Gaiseanu, 2020g), which are difficult to be matched by current technologies. Within such a large range, it is not difficult to recognize so many and various forms and capacity of knowledge (like “consciousness”), even if elemental, incipient, and reduced, necessary for exploration of reality in the living world, specific to each species, depending on the sensorial and info-processing “tools” which each

species/exemplar is endowed with, and on the complexity degree of the evolution/organization scale, even if some of them (plants, bacteria) do not dispose of a nervous system (Gaiseanu, 2022g). The basic common structure and functions of the living structures shown by IMHBLS justify such a conclusion (Gaiseanu, 20211).

Therefore, further studies to exhibit the determinant role of thalamus as a basic neuro-switching support of consciousness, could consist in the deactivation of the thalamus at testing mammals (rodents), which can be made by injuries/damage or by anesthetic intervention, producing its inoperability, and the comparison of the fMRI (or variants) results, with the fMRI diagram obtained in a state of activity of the same individual. The testing during the activity of the brain could refer in terms of IMHBLS to the fMRI behavior observation concerning the decision acts (equivalent with Iwant), emotions (induced by danger-amygdala—Ilove), or mate intention/process (Icreate).

Conclusions

The main conclusion of this paper is that mind and consciousness are a result of the informational activity of the informational systems of the human body and living structures, in particular represented in the last case by the eukaryotic cell. This conclusion is drawn on the defined concept of matter-related information, as a result of the operability of the physics, chemistry, biology, and/or mathematics laws on matter. Information is therefore a result of an operational process, hidden in the matter compounds during a structuration process, and observable/transmissible when these compounds are submitted to a destructuration process.

The info-perception and info-transmission of information, is operated by informational YES/NO binary Bit-type mechanisms, basically between complementary components of the body, assuring the intra and inter-cell communication and the transmission of information between various components of the organism. The mind is therefore the result of such interactive communication within the circuitry of the body and the info-processing assuring the perception of information by the sensor network (CASI), characteristic also to each cell, indifferently on its specific tasks in the organism, processed by CDC at global and individual (cell) level, sentient by IES/IRSS and monitored by IC, which maintains the right info-functioning established with respect to the reference values (life experience, decisional criteria, and inherited features and tasks), finalized with an output response, expressed also in terms of information (attitude). The mind reflects therefore the capability of human to have access to the informational field of data (memory), activating the necessary information and introducing it in the informational process for decisional making, while consciousness is the reality detection by means of the cognitive centers, allowing the exploration of the external and internal reality, projected on the mental display (prefrontal cortex), like a “mass-media” information. So, the human being absorbs and emits/detects information similarly with a mass-media “device”, but as a completely distinctive complex cognitive-sentient organism, living (in vivo) his/her personal life. The most relevant demonstration that information is a fundamental component of the world, in this case of the living word, is just this capability.

To activate consciousness, it is necessary to run information in two steps, one for feed-forward operation and another as a feedback operation, necessary for the comparison with the existent informational field of data and recognition of information, as IMC/IMHBLS already preconized. This finding was earlier obtained from the analysis of the information dynamics within the informational model of consciousness and recently by experimental results, well supporting the informational model. A recent experimental study reveals also the recognition words/sentences interface stipulated earlier by the informational model, showing that the dynamics of words and sentences meaning during the reading involve the activation of two distinct brain networks, in the frontal and temporal lobes.

The phenomena of intuition, inspiration, premonition, “deja vue”, retrocausality, and intentionality were discussed, taking into account the activity of IC center, supported by the anterior and posterior cingulate cortex, and also the phenomenon of past memory, suggesting the implication of the activity of IGG, rising from a “deep (genetic) memory”.

The experimental studies indicate that the minimal operational support of mind and consciousness seems to be the cortico-thalamus axis, a conclusion drawn also earlier within the informational model of the human body and consciousness, based on the analysis of the info-operability of the informational system of the human body and living structures, well supporting it.

The results discussed here within the informational model unify the eastern and western concepts/models on consciousness and mind, explaining the energetic Yung/Yin model by YES/NO—informational Bit type behavior, the Plato’s ideas/forms by the concept of information, Aristotle’s materialist view on the reality substrate by matter-related operability and matter structuration, and the significance of the archaic model of the seven “chakras” at human by the components of the informational model.

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