

The Informational Model of Human and Living Structures: Consciousness is a Result of the Info-Conduction/Operability of the Informational Systems/Structures and Micro/Macro Info-Devices of the Body

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ABSTRACT

In this paper it is shown that the Informational System of Human and Living Structure is able to explain the structuration and behavior of human and subhuman organisms, including the basic component of human, animals and plants, which is the eukaryotic cell. For this, it is shown that the living organisms are connected to two main sources of information, represented by the internal/implicit genetic source, defined as iS, and explicit/external sources defined as eS, which include also the sources detecting the status of the body. The connection to matter (foods, water, air) sources, defined as mS, allows to provide energy and the necessary substitutional/added micro-elements for body running processes. Information in living organisms is defined as matter-related information (mrl), involved in structuration/destructuration, configuration/reconfiguration processes, which absorb/release information during the application of the physics, chemical, biologic and mathematical laws on the micro/macro-structural components of the body, working as/like informational operators or informational devices. The connection to iS explains the body structure, the building of informational circuitry, sensors and the other informational tools. The connection to eS allows the optimal adaptation to the external cues, by means of info-transduction transmission/operability by micro/macro info-devices of the body, and decisional processes toward TARGET/TERMINAL steps. Consciousness at human is a result of such informational processes, operated by MIND – an informational device working basically with DECISION and MEMORY components in two operational steps. This Informational Model of Human and Living Structures (IMHLS) is demonstrated thus to be a reliable, new and revolutionary way to explain the functioning of living organisms and consciousness, demonstrating also the priority of the Romanian contribution in this front-line investigation field.

Keywords: Information; Physics/Chemical/Biologic/Mathematic Laws as Info-Operators; Informational Devices; Structuration/Destructuration Processes; Implicit/Explicit Informational Sources; Informational System of Human and Living Structures; Transduction/Decisional Processes; Micro/Macro Info-Devices; Memory; Mind; Consciousness

Abbreviations: MRL: Matter-Related Information; ISHLS: Informational System of Human and Living Structures; IMHLS: Informational Model of Human and Living Structures; EE: Execution Elements; ISH: Informational System of Human; ATP: Adenosine Triphosphate

Introduction

Consciousness is one of the most debated concepts on our informational era [1], and although information is already largely recognized as part of the present activities both within the private and professional fields, the concept of information is little applied in the investigation of the human organism and even less in other living

structures. Observing this gap between such a revolutionary involvement in technical and scientific fields of information [2-4], and the acknowledgement of informational role in biologic structures [5,6], important efforts with remarkable results for understanding the mechanisms of life and consciousness [7] have been made to introduce this concept on this field [8]. Historically, consciousness was

approached by philosophy, which focused especially on its forms of manifestation, considering it a species distinct of the matter/material human body, within the so called mind-body problem [9-11], and such a traditional view is still maintained till nowadays, in more or less evident or implicit/explicit way, because the majority of the studies dedicated to consciousness, do not relate consciousness to the mechanisms of the transport of information within the body as a unique and contributing entity to the involved processes, and limit the view only to brain activity [12]. The actual approach of models on consciousness is roughly divided into two categories: classical and quantum models. In the first categories can be cited the Global Workspace Theory [13], which approaches the dynamics of consciousness with the representation on a global workspace like on a school board, based on the priority of certain information to be represented within the competition with others, depending on the inter-relation between the sub-conscious and conscious centers. The Information Integration Theory (IIT) [14], is rather involved on the philosophic debate regarding if consciousness is or not an “irreducible/integrated/integral reception of reality [12], associating to the philosophic concept of Qualia, a theoretical/calculated significance, based on a axiomatic/theoretically deduced factor. The Orchestrated Objective Reduction – (Orch-OR) [15,16] refers to the activity of microtubules from neurons as quantum resonators, which on the basis of non-computable ‘orchestrated’ processes, allow consciousness. However, none of these models of consciousness does take into account actually the fundamental role of the mechanisms of the transport of information in the living organisms, by structuration/destructuration processes, independently if this transport is made by nervous system or by living matter itself. In this paper it is shown how human and living structures work with information, and how consciousness is a result of the info-conduction/info-operability by structuration/destructur-

ation processes, within the so defined Informational Model of Human and Living Structures (IMHLS). This model explains for the first time coherently the mechanisms of info-transmission in human and living structures and defines the Informational System of Human and Living Structures (ISHLS), demonstrating how they use during the interaction with external information sources their informational tools, built/structured by own self-structuration/self-organizing processes through the interaction with own implicit source of information. It is shown also that the interpretation of reality is achieved by comparison with acquired data in memory, represented in a virtual form by consciousness.

The Informational Model of Human and Living Structures: Information and Info-Organization

The basic concepts and evidence which the IMHLS is based on, are the following (Figure 1):

The living systems are connected to two main sources of information (Figure 1). One of them is the internal/implicit, genetic source (iS), consisting in genes/genome, the structural MEMORY of every cell in plants, animals and human. In bacteria, the most “simple”/basic living structure, the organelles are not sharply defined, like in the eukaryotic cell. Instead, these are spread in the cell cytoplasm, but the functions are similar with that of the eukaryotic cell [17]. Another source of information (eS) consists in the multitude of external/explicit sources, where all the living organisms, including the singular basic structures like bacteria (prokaryotic) and protozoa (eukaryotic) cells, are connected. In the same category are included the internal sources, indicating the organism status and needs like hungry, thirst, pain, etc.

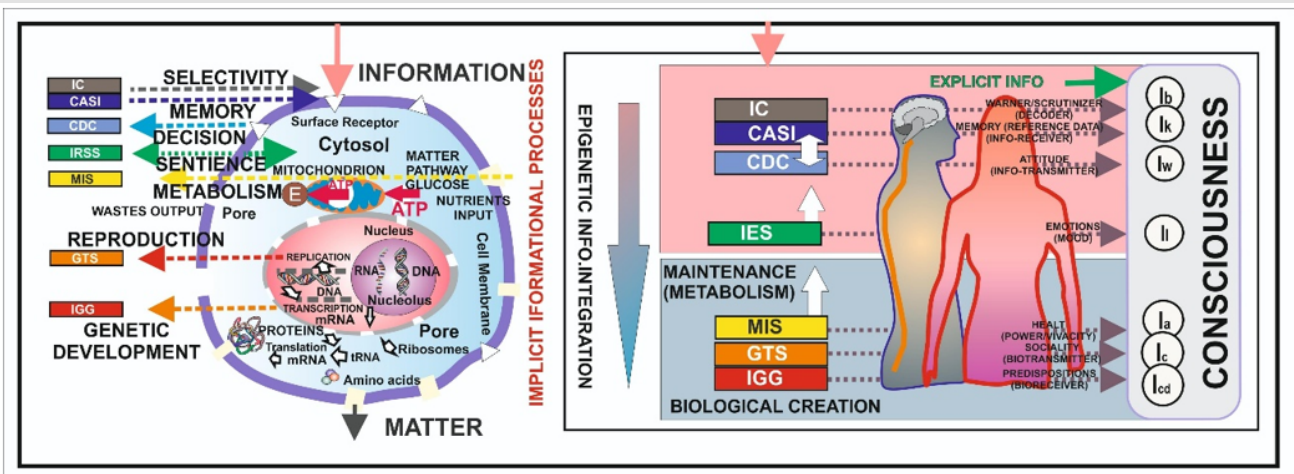


Figure 1: Schematic representation of the informational activities in the eukaryotic composing cell (left side) and in the human body (right side), showing the components of the informational system of the cell and of the human body, as well as the corresponding cognitive centers of consciousness.

Information is defined as a result of an operation, a consequence of the application of physics, chemical, biologic, mathematical laws, working as operators in the micro-particles system of the living organisms [1,18]. In particular, information I is “embodied”, becoming a matter-related information *mrI*, or “disembodied” as released information, during the structuration/destructuration processes [19]. For exemplification, such an informational mechanism can be suggestively explained taking into account two micro-material components A and B, which during their interacting process of structuration absorb/embody information (*mrI*), and during a reverse, destructuration process release/disembody information, according to the informational relation:

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

The operability of such a mechanism is evident for instance with in the replication process of deoxyribonucleic acid (DNA) molecule in genes [18], for the initiation of the cell reproduction [20] (Figure 1, left side), which can be schematically represented by the following relation:

$$DNA \Rightarrow 1/2 DNA + 1/2 DNA + (2New Strands) \Rightarrow 2DNA \quad (2),$$

The DNA structure consists in two helicoid strands of carbon atoms, transversally connected with “bridges” of four distinct components – nucleotides (Figure 1 left side), i.e. Adenine (A), Guanine (G), cytosine (C) and thymine (T). From an informational point of view, these structural elements behave like four “letters” of a specific “alphabet”, which can compose various “words”/messages, formed by combinations in a very large number of possibilities in the DNA molecule. These “letters” can be coupled by structural complementarity only in a certain way: A from a strand only with T from the other strand by means of an atom of hydrogen, and G only with C, in a binary YES/NO Bit-type structure. In the relation (2), the splitting of DNA releases two informational complementary strands, which by completion during a subsequent restructuration process with necessary (complementary) nucleotides, includes (embodies) each of them the full initial information of the DNA molecule, so two identical mother-daughter molecules are structured in this way.

The operability of relation (1) is also evident in the transcription-translation process for protein fabrication in cells, as shown below, or manifested by the complementary-based YES/NO Bit-type ligands connection to surface receptors of cell membrane, acting as signals detected by cell surface specialized sensors, which trigger a cascade of reactions chain toward genes, activating (YES) or inhibiting (NOT) their expression [21]. In similar terms could be treated the configuration/reconfiguration of the nervous network in the brain, for memory and recalling/retrieving processes. This refers to the nervous cellular/synaptic strength and (re)connection dynamic processes in memory [22]. But probably the most evident and sugges-

tive example of embodiment/disembodiment of information in the living organisms, is represented by the epigenetic processes, which consist just in the physical incorporation/embodiment into the genetic structure of the insistent/repetitive information received from (eS), driven by info-physical-chemical mechanisms in cytoplasm and genes [23,24], which is disembodied and manifested in new traits, trans-generationally transmissible.

Information is also a result of the operability of micro/macro-systems of the body components, which are able to work as informational micro/macro devices in the living structures. Examples of such micro-devices in cells are:

- (i) The genetic system genes/genome in cell nucleus, so nucleus itself, running informational operations, acts actually as an informational device [20,25];
- (ii) The ribosomes in cell, convert the informational “language” of mRNA (messenger ribonucleic Acid), which copies various DNA sequences (seq (DNA)) in a new informational “language” expressed as tRNA (transport RNA) [18,21]. Such a transcription-translation process, based on structuration/destructuration mechanisms (relation (1)), may be carried out only in a forward direction, according to the biologic dogma [26], like in the informational semiconductor diodes, and can be written schematically as follows:

$$Seq (DNA) \Rightarrow mRNA \Rightarrow tRNA + Amino Acids \Rightarrow Protein \quad (3)$$

In the nervous cell, the process of K⁺/Na⁺ (ionic Potassium/Sodium) commutation around the cell membranes, assisted by energy E from mitochondria, to maintain the concentration gradient against the diffusion force, allowing the translation of electrical pulses along the axon [22], acts actually as a specific informational micro-device in this cell.

Information in living cells and organisms are transmitted by transduction processes, from a form of message/information to another, typically by means of a chain of info-chemical reactions in the cell, from nucleolus (relations (2) and (3)) to cytoplasm during the interaction with iS, or from the surface receptors to cytoplasm (during the interactions with eS), finally thus toward a TARGET; in the first case toward protein production or cell division, in the second case toward the nucleus/genetic system itself. Such a process can be schematically represented by the following info-relation:

$$Info \Rightarrow (A+B)+(Info1) \Rightarrow C(mrI1) \Rightarrow (D+E)+(Info2) \Rightarrow F(mrI2) \Rightarrow (G+H)+(Info3)...(= TransductionChain) \Rightarrow TARGET \quad (4)$$

where the symbol => represents the info-transmission/transduction, A, B, D, E, G, H ... are the interacting micro-material components with information transmitted toward the TARGET, Info is the input information, and Info1, Info2, Info3... are the transduced informational messages on the TransductionChain, implicitly defined above in

relation (4), mr1, mr2, mr3... is the hidden information in the intermediary compounds C, F, etc. Such an info-communication process is also applicable for the cell-cell transmission, either between nervous or non-nervous cells in multicellular organisms [20], or in cell colonies [21]. That is because cells act as informational devices, communicating by chemical/physical agents [20]. A suggestive example of transduction is the communication process between nervous cells themselves: although the main signal along axon is of electrical nature, the transmission through the synaptic gap is performed by neurotransmitters [22]. An example of macro-pathway/circuit of multiple info-transductions is represented by the info-connection between a local sensor of the body (eye, ear, touch-sensing element) with the brain, or between any other system of the body with the brain or between themselves, independently on their functions.

The cells/organisms or various composing structures/organs are able to connect to a TARGET, interpret (analyze/compare) the external and internal information with the existing information (inherited or acquired) in MEMORY, used as DECISION CRITERIA (symbolically represented by DECISION|Criteria in the relation written below), and react/respond, so DECIDE and finally COMMAND by means the operator (Exe) an execution (Exe|ExecutiveSystem) to execution elements (EE), allowing to comply with their tasks. The informational circuits in cell are sharply formed and protected from interaction between various types of signals by contribution of scaffold proteins, fabricated/structured by transcription-translation processes [16,27]. Such a virtue can be represented schematically by the following informational relation:

Info => TransductionChain => DECISION|Criteria => Exe|ExecutiveSystem (5)

The DECISION action at various inferior levels/structures of multicellular or unicellular organisms/structures, is equivalent with the turn on of a dynamic structural system toward a new stable solution, after traversing a previous critical/transitory state, according to a programmed/learned pathway, or a new one, but always by comparison with the previous experience, because certainty (sure information) vs. uncertainty prevails, as it was commented above for structuration processes. In automatic running processes, the experienced pathways of decision are always strictly respected, otherwise the running cycle is out of control, determining the failure of the entire system. Freewill at human during the interaction with eS offers a high flexibility and high degree of liberty in choice among various options, just to dispose of a larger range of possibilities for a better/optimal adaptation in complex circumstances. At animals, the execution system consists in muscles and limbs (EE), at bacteria and sperm in flagella and cilia [18], and at carnivore plants in trapping elements [28].

The cells and living organisms are able to build themselves the informational tools – sensors for receiving the input Info, circuits, informational micro/macro devices by interaction with (iS) and (eS), for connection to external/internal environment and detection, trans-

mission, processing of information for interpretation, decision and command, within the TERMINAL final process, which is the informational output. The living organisms work actually as INFORMATIONAL DEVICES with two output TERMINALS: an info-output of reactive information after the interaction with eS, and an info-genetic output for reproduction, after the interaction with iS [20,29]. The nucleus itself is actually an incredibly precise informational device, working for reproduction (relation (3)) or for transcription-translation processes (TransductionChain – relation (4)) with remarkable precision for the reproduction and fabrication of the necessary proteins which serve as bricks of the body (TARGET), with TERMINAL location in cytoplasm [21,25]. Such an accurate transmission of information is assured during and after this process by means of the mismatch repair mechanisms [30], going from incredible rigorous “scan”-type processes of the new DNA by specialized enzymes for mistakes detection, to the “surgical” removal of incorrect areas and their rectification, improving the error rate of DNA structuration from about one in 10⁷ nucleotides to hundred-fold to one in 10⁹ nucleotides [30].

The living organisms are actually informational devices with two informational inputs and two informational outputs: an info-genetic input represented by the zygote (fertilized) egg, an info-genetic output for reproduction of new offspring, assuring the body building from (iS), and an info-input for connection to information from (eS) and info-output expressing the reactive response [31,32]. The high versatility of cell to produce a large range of organic compounds, with close but distinct properties, within a very close range of temperature and conditions, among from enzymes are able to decrease the barrier energy and to control a large range of chemical reactions, explains the high adaptability of living structures, so their large diversity on the entire organizational/evolutionary scale [33]. Despite of the different genome, and despite of the organizational micro/macro complexity scale, the sensory elements (input sensors) connected to (eS), shows relevant parallels between the sensory “logic” of human and that of the bacterium’s cell [21,34]. Precursors of the basic senses, as well as the operability of a DECISIONAL/EXECUTIVE system in function of circumstances, visible at animals, can be observed also at inferior organisms like single eukaryotic cells and bacterium: this small independent organism is endowed with sensitive sensors and appropriate EEs to detect foods, to move toward them, or in a contrary direction when their concentration falls [21], or toward more oxygenated locations, driven by the orientation of the earth magnetism, or toward/against light. Archaea, protozoa or bacteria, such eukaryotic or prokaryotic unicellular organisms, live a successful life without a nervous system. The eukaryotic immune cells in human/subhuman organisms can decide for instance as a function of local/momentary circumstances how to organize their body plasticity to destroy/“eat” the intruders [21,35].

Hormones in human/subhuman organisms are non-nervous (endocrine) communication agents, with important/fundamental role of

info-transmission at large distances (TARGETS) in the body [10,11]. The spermatozoon is a single, smallest cell in the male body, with limited lifespan, which cannot divide, formed by a head with 23 chromosomes (half of any other male cells), a body with a mitochondrion (energy supplier) and a tail, but which shows an amazing “programmed intelligence” to go by own motile EE appendix (flagellum) to the specific TARGET (the egg – ovum of female), outside of the organism of origin (male), and penetrate it for fertilization [36]. Maybe surprisingly but based on observed correlations between fertility indices of sperm (concentration, count and motility) and cognitive test results, intelligence and semen quality seems to be positively related [37], although such a relation was not confirmed more recently [38]. Experimental imaging studies show that the singular nervous cell seeks connections with other nervous cells, developing around in a dynamic process various connecting axons [39]. Such a behavior demonstrates that even at this level, the cells in multicellular organisms dispose of a “native” programmed “intelligence”/ knowhow/knowledge in following their fat/destiny/ tasks and duties [40].

The “engineering” intelligence of living matter can be seen also in the artistry which this living matter, connected with iS, succeeded to design and built eyes and hearing sensors, as informational effective devices for efficient interaction with eS (high adaptation), so such complex structures can serve as example for artificial devices. Smell sensing, consisting in the differential detection of chemical effect of various substances, or touch, detecting differential mechanical pressure, are probably the most ancient senses, existing even at singular prokaryotic/eukaryotic cells, depending on adaptive circumstances. Remarkable also is the differentiation capability of the immune cells to distinguish the virus or other pathogenic intrusion species, from the native cells of the organism, and their ability to destroy them [35]. Plants are stationary organisms, able to prepare themselves the glucose-based foods from local resources and light-assisted processes, but they also compete for sufficient space by roots (“intelligent”-type organs) and branches [28]. They are endowed with capabilities to detect predators, to communicate the alarm or damage states by hormone-like agents, or to attract insects for pollination [27].

All living organisms are connected to material resources from neighbor environment, defined as matter sources (mS), and are able to transform them in energy from glucose-based components, and to select/prepare the appropriate substituting micro-elements for body maintenance. Such a process is automatically driven in all organisms on the entire living scale, with similar basic functioning principles. The organelle in eukaryotic cells shows similar behavior/functionality like organs in animals and human [33], but plants can prepare themselves the glucose-based input component by interaction with light [28].

Consciousness is a Result of the info-Operability of the Informational System of Human and Living Structures

The activity of the Informational System of Human Structures (ISHLS) is supported by the body cells and specific structures working like informational structures and/or micro/macro informational devices, as discussed above. The Informational System of Human (ISH) and subhuman organisms is managed by the brain and is connected with corresponding systems/organs in the body [41], as it is schematically shown in Figure 1 right side. According to the above discussion, the following components of ISHLS, in particular in the eukaryotic cell (Figure 1 left side), can be defined as follows.

a) CASI is the center of acquisition and storing of information (MEMORY) in connection with eS and with the corresponding sensor network, supported in brain by the prefrontal cortex (short-time memory), hippocampus (long-time memory), cerebellum (motor-type abilities) and thalamus as a sensory info-distributing/integrating hub in the center of the brain, represented in cell by genetic memory in nucleus, and the network of the sensors (surface receptors) and the connecting circuits.

b) CDC is the center of decision and command, supported at human by the prefrontal cortex and cortex hemispheres, and by the pre-nucleus/nucleus reactive circuits/structures in cell, processing the received information from eS for decision, according to circumstances (relation (4) and (5)), for adaptation and survival.

c) IES/IRSS is the info-emotional system (IES) in human and subhuman organisms, and info-reactive sentient system (IRSS) in inferior (without nervous system) organisms. In human, this is supported mainly by the limbic system (hippocampus, amygdala – alarm component, hypothalamus), managing emotions as response to received/recalled information, and in other living organisms at least by the corresponding defense alarm elements.

d) IC is the info-connection center, dedicated to maintain the connection within the permitted informational range, inherited/acquired during the interaction with eS of every species/individual, expressible at human by empathy, preferable attention, compatibility, beliefs, mentality, (supported by the anterior/posterior cingulate cortex [41,42]). At other organisms, IC is represented by specific adaptation range of qualities, allowing the orientation/connection with suitable informational sources (eS), according to the local living conditions: bats for example use a sonic radar system for connection and orientation. At cell, this is manifested by the connection only to the necessary specific/selected information, which allows to fulfillment of the right duties, either as independent or as a part of multicellular organisms with specific differentiated functions [18,21].

e) The GTS is the genetic transmission system, allowing the reproduction, related at human in brain by hypophysis and hypothalamus, in connection with sexual organs in body [19]. At inferior organisms, GTS is represented by basic multiplication/division of cell, connected with *iS* (relation (2)), or by any other form mentioned above.

f) The IGG is the info-genetic generator, which allows the development of the body according to age, including the immune system [35], by connection at human/mammals with the hypophysis/hypothalamus. In cells IGG is based on the development system – nucleus/ribosomes/cytoplasm, by connection with *iS* for protein fabrication, according to the relation (3).

g) The MIS is the maintenance informational system, which manages the digestive processes for energy production and preparation of the substituting/added necessary micro-elements from foods (nutrients, water, air), defined above as matter related source (*mS*). At human, this is managed mainly by the stem brain, connected to the digestive system. At cell, the digestion is performed along the digestive pathway by specific organelles like mitochondria, for energy production from adenosine triphosphate (ATP) [33], as it can be seen in Figure 1 left side.

According to the above discussion, the informational system of human (*ISH*) can be defined as:

$$ISH = (CASI + CDC + IES + IC) + (GTS + IGG + MIS) = OIS + PIS \quad (6)$$

where *OIS* is the operative informational system for real-time adaptation, and *PIS* is programmed informational system for reproduction, body development and maintenance. A similar system acts in other living organisms, where *IES* is substituted by *IRSS*. *MIND* is an operational informational system coupled with *ISH* as a *TERMINAL*, acting like an informational device to activate/assure the access to *MEMORY* by means of the operator *THOUGHT*. Such a system operates over *MEMORY* both for registration/reordering of the new information, and for recalling the stored information for the projection on the prefrontal cortex, like an informational device. The result of such an operation is information, according to items 2 and 3 discussed above. Such a system assures actually the reproduction of the external real-time recorded information for a short-time period on the “display” of the prefrontal cortex, like mass-media information on the screen of the informational devices. Moreover, this allows to work with the recalled/retrieved information stored for a longer time period in *MEMORY* by means of the “mind eye”, because the used imagery circuits in this case are practically the same [11,42]. Such an info-operational action can be described schematically by the following relation:

$$MIND | THOUGHT (ISH) \Rightarrow Iself = Iknow + Iwant + Ibelieve + Ilove + Iam + Icreate + Icreated \quad (7)$$

where *Iself* is the Self/*I*, perceived in own mind by means of the cognitive centers corresponding to the activity of each component of *ISH*: *Iknow* (*Ik* in Figure 1 right side) is the perception of memory (in-

fo-input), *Iwant* (*Iw*) of decision (info-output – Attitude), *Ilove* (*Il*) of emotions, *Ibelieve* (*Ib*) of trusting experience, *Iam* (*Ia*) of self-status/vivacity, *Icreate* (*Ic*) of biologic creation (info-genetic output), sociability/family, and *Icreated* (*Icd*) of inherited attributes (info-genetic input) (Figure 1 right side). The human mind works with conceptual information by means of language, a full set of concepts associated with detected reality, “codified” and “decoded” by the learned dictionary. *MIND* works thus actually with concepts about reality, virtually detected (by means of the sensorial network) and memorized (*CASI*) by own informational system from the environmental reality. When is born, the child’s memory is in blank state, and the connections of the nervous system are changed and developed rapidly, the consciousness state is practically null [12]. The connection with reality is developed as much as the informational tools (senses, memory, operational mind for info-processing) become able to take over their tasks [12], allowing unleash the mind to the change [43] and personal development and evolution [44] during the life. *MEMORY* is also a device for storing information, which succeeds in doing its tasks by molecular, plasticity processes and info-connectivity of the neurons. Information is thus stocked and retrieved by intervention of physics/chemical/biological processes, with info-embodiment/disembodiment effect, as explained in the item 2 and 3.

Such processes are based on a fragile dynamic balance between configuration/reconfiguration, change/stability of various nervous networks in *CASI*, and on the synaptic strength combined with the synchronization induced by the electromagnetic field of various frequencies due to the electrical transport in axons [22]. Epigenetic processes are defining contributors for info-incorporation in the genetic system of intensive/repetitive cues [24] resulted from the connection with *eS*, which create new traits without modification of the characteristic of species, schematically represented in Figure 1 central side by the arrow pointing down, from *CASI* to *IGG*.

The understanding/awareness of reality is performed in two steps [22]:

(i) one of them consists in the detection of information at the interface of mind with the “raw”/non-conceptualized (non-“decoded”) information.

(ii) a second step is necessary for the conceptualization of the received information, according to the “decoding” abilities of the receptor [11]. Such a process consists in a comparison of raw/primary information with the existing “dictionary” memorized in *MEMORY*, to “discover” the associated meaning. Consciousness is therefore a representation of the virtual reality detected by own sensors, transduced successively through various steps in various informational stages/systems and/or micro/macro devices (relation (2)), toward final *TERMINAL* (*MIND*), where the information is reproduced on the prefrontal cortex, the “display” of the *MIND*, interpreted accordingly with the implicit/learned dictionary of language. *MEMORY* is therefore a deci-

sive contributor supporting CONSCIOUSNESS. The operative system of MIND is actually CDC, which activates/sustains information and their comparison with the memorized/stored information in MEMORY for further decision on YES/NO Bit-type acceptance/rejection on a chain type process. The operative tandem CDC/CASI, working as CDC \leftrightarrow CASI is actually the base of CONSCIOUSNESS. The forward relation CDC \Rightarrow CASI involves the activation of memorized info from MEMORY, while CASI \Rightarrow CDC means that CASI provides information to CDC for comparison and further decisions on the chain of YES/NO Bit-type progressive processing Transduction Chain steps of MIND.

Such a double-phases connection to reality and its representation as consciousness, based on an advanced analysis of the info-operability dynamics of MIND [22] and discussed here, is supported also by recent results [45], based on computer-assisted analysis of brain running processes for the activation of two successive brain networks, connecting basically the prefrontal cortex in a first feed-forward step of perception, and the occipital zone of the brain during a second feedback step (necessary according to IMH for understanding/"decoding" of info-significance [11,22]), within a feed-forward/feedback bidirectional process. In other recent studies, dedicated to understand the brain running to detect/"decoding" the meaning of a certain sentence during the reading of texts [46], it is shown also that the prefrontal cortex is involved in a primary perception, and in a second phase/step of activation is involved also a network of the temporal lobe, both of them interchanging information [47]. These studies consolidate the findings deduced within the IMH, concerning the perception and decoding of information as necessary imprescriptible steps running by MIND to activate the full "lighting lamp" of CONSCIOUSNESS [11]. These findings are also demonstrated by the warning alarm signals of amygdala (IES), which detects automatically/spontaneously the nature of the received information during a second scanning/decoding step, by comparison with the memorized information, and as well as by the automatic activity of IC during the same second step, which warns on the inconsistencies/disagreement between trust/reference existing/memorized and uncertain received information, as IMH shows [11].

Thalamus, belonging to CASI, plays a central role in the administration/management and integration of the informational flowing streams toward and from the frontal cortex coming/going from/to other zones of the brain, so this brain component is imprescriptible for activating/deactivating consciousness [11]. Experimental observations shows a massive innervation of thalamus from cortex [48], so a close info-connection between CASI and CDC, like IMH claims. Various evidences, among which the observation of a drastic reduction of thalamic metabolism and blood flowing, determining subsequently a reduced activity in many other cortical regions, as an effect of administration of most anesthetics, allow the undisputed conclusion, generally accepted, that the inactivation or isolated damages of thalamus and/or of the cortico-thalamic regions of the brain, abolish

CONSCIOUSNESS, whereas lesions of other parts of the brain do not [48]. Such experimental results support the outcome of IMH, which reveals that the CASI/CDC tandem sustains basically MIND and COMSCIOUSNESS. The quantic approach of consciousness is basically supported by very small nanocomponents of cells, which can act as quantic resonators, and the possibility that the activity of these resonator to interact within an orchestrated fashion. According to IMH, such an activity belongs to CASI, which encompasses any sensorial info-detection network. According to IMH, CONSCIOUSNESS is a primary result of the info-conduction/operability of the ISHLS, supported by informational systems/structures and/or micro/macro" devices" of the body, which drive successive info-transduction structuration/destructuration TransductionChain cascades of info-reactions, as it was explained above.

Conclusion

The question regarding the nature and mechanisms allowing CONSCIOUSNESS is approached and explained by new informational concepts: matter-related information, info-transduction, TransductionChain, DECISION and MEMORY, TARGET/TERMINAL steps of information, micro/macro info-devices/structures, with exemplifications and application in human body and in the living structures, in particular in eukaryotic cell, the basic component of human, animals and plants, or living as autonomic organism. The connection to the implicit (genetic) sources of information (iS) explains the info-structuration and self-organization of the living organisms by structuration/destructuration and info-transduction processes. The connection to the explicit external/internal sources of information (eS) explains the operative adaptation to external stimuli/cues, in particular by epigenetic processes. The connection of the body to material sources (mS) on the entire organization scale of living organisms assures the production of energy and the micro-nutrients for the body functioning.

CONSCIOUSNESS is a result of informational processes in human organism, as a representation of external reality transposed in MIND, which is defined as an operational system/device, acting by means of the THOUGHT – a specific operator on MEMORY. The transduction of the info-activity of the informational system of human (ISH) results in the detection of Iself in MIND, as a contribution of all informational components of ISH. The activation of CONSCIOUSNESS is a two-step process, with an imprescriptible implication of thalamus, necessary for primary info-detection and the decoding of the info significance. The primary mechanisms for activation of CONSCIOUSNESS are based on informational processes described above, and the operability of MIND is based mainly on the DECISION – MEMORY interaction for data comparison and decision. The experimental evidence well support the informational concepts and CONSCIOUSNESS, as described by the informational model of human and living structures, revealing its reliability and the priority of the Romanian contribution on this front-line investigation field of life and consciousness.

Conflict of Interests

No any.

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