

TRANSITIONAL STATES OF CONSCIOUSNESS AS A BIOPHYSICAL BASIS OF TRANSPERSONAL TRANSCENDENTAL PHENOMENA

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Abstract. It is pointed out (in the framework of the author's biophysical relativistic model of altered states of consciousness that *transitional states of consciousness* (as transpersonal biological macroscopic quantum gravitational tunneling phenomena) represent an excellent framework for understanding and mental control of *transpersonal transcendental states of consciousness* described in various religious and esoteric traditions of East and West during the history of civilization, implying their real biophysical nature. Transitional character of these states also demonstrates why these phenomena are *short-lasting* and *poorly reproducible*, and also why they are most easily *mentally controlled* shortly before a waking/sleeping transitional state. This might be also an explanation for extraordinary efficiency of *prayer* accomplished shortly before sleeping, which is recommended by all religious traditions, and its significance in *mutual reprogramming of psychic conflicts* (as a germ of the future interpersonal fights, as well as of potential psychosomatic and psychological disorders of the persons in conflict) during transpersonal interactions of the persons in conflict in transitional states of the praying person (with direct mental addressing to the person conflicted with, or *energetically more efficient* indirect mental addressing via ionically abundant disembodied archetype structures from religious traditions). At the same time, this offers a new insight in *psychosomatic health and illness* as essentially *transpersonal* phenomena, because a curing of psychosomatic disorder in only one person involved in some conflict without *mutual* reprogramming of the psychosomatic conflict is not final - as the non-reprogrammed conflict in the other person cause its (unconscious) *transpersonal reinducement* in the first one, in mentally-loaded transitional states of consciousness of the second one. All this suggests that deeper biophysical understanding of the nature of consciousness and transpersonal phenomena might soon give rise to scientific understanding and empirical verification of even fundamental philosophical/religious questions (like practical/spiritual significance of *imperative moral behavior* of every individual, extremely important for accelerated integration and spiritual evolution of personality) - and appearance of a *new humanism*, without meaningless and painful interpersonal, interethnic, and interreligious conflicts.

Keywords: *theoretical mechanisms, biophysics, relativistic & quantum physics, brainwaves, neural networks, ionic structures, transcendental states of consciousness, transitional states of consciousness, altered states of consciousness, acupuncture system, psychosomatic healing, religion/esoteric transpersonal conflict reprogramming, prayer, morals.*

1. INTRODUCTION

It is currently estimated that the problem of consciousness belongs to ten most significant scientific problems, owing to its potential scientific implications, including a possibility for deeper understanding of some ultimate philosophical/religious questions, traditionally remaining outside the domain of theoretical and experimental methods of natural sciences, being therefore a subject of deep and painful irrational divisions throughout the whole history of human civilization.

The prevailing scientific paradigm considers information processing inside the central nervous system as occurring through hierarchically organized and interconnected neural networks. Along with development of experimental techniques enabling physiological investigation of interactions of hierarchically interconnected neighboring levels of biological neural networks, significant contribution in establishing the neural network paradigm was given by theoretical breakthroughs in this field during the past decade [1]. Apart from the brain's hierarchy of neural networks, a significant role in global distribution and memorizing (over the whole cortex) of hierarchically processed information is played by brainwaves [2]. Of particular interest in this process is also extended reticular-thalamic activating system (ERTAS) [3], as a hierarchical system of neural networks which compares currently processed information with the one memorized in the cortex, giving priority and amplifying one piece of information to the conscious level; the remaining pieces of information rest nonamplified at unconscious levels. This is basically also the mechanism of "emotional coloring" of some information.

A particularly significant role of brainwaves involves modeling states of consciousness - and especially altered states of consciousness, characterized by extraordinary acceleration in psychological information processing, which cannot be explained by purely electrochemical intersynaptic processes in biological neural networks, because these mechanisms of the ERTAS are not accelerated up to several orders of magnitude, as the subjective time sense is dilated in altered states of consciousness [4-6] - in respect to the normal awake state.

According to the author's biophysical model for altered states of consciousness [7-9], the electromagnetic (EM) component of ultralowfrequency (ULF) brainwaves, related to "subjective" reference frame of consciousness, enables perfect fitting with narrowed-down limits of conscious capacity in normal awake states and very extended limits in altered states of consciousness - due to the biophysical relativistic mechanism of dilated subjective time base. In this model, consciousness is subtle internal display in the form of EM component of the "optical" microwave (MW)/ULF modulated quantum holographic neural network-like acupuncture ionic system, in which a complete information (both conscious and

unconscious) is permanently coded from brain's neural networks, as a spatio-temporal pattern resulting from changes of the electrosynaptic interconnections in the neural networks of the brain. Then, according to this model, *altered states of consciousness* (REM sleep, meditation, hypnosis, psychedelic drug influence, some psychopathological states, and near-death experiences) are a consequence of partial displacement of the ionic acupuncture system outside the body (when the embedded EM component of ULF brainwaves is propagating through this weakly ionized structured gaseous medium of low-dielectric relative permittivity, $\epsilon_r \approx 1$), while normal states of consciousness (alert state, non-REM sleep, ...) are achieved when there are no such displacements (when brainwaves are propagating only through the structured brain tissue of high-dielectric relative permittivity, $\epsilon_r \gg 1$)!

According to the model, dreams and dream-like hallucinogenic states are characteristics of altered states of consciousness ($\epsilon_r \approx 1$), when the relativistic Doppler mapping of EM component of the "objective" ULF brainwaves power spectrum on the zero-degenerate frequency "subjective" spectrum - enables dream-like mixing of normally conscious and unconscious contents. This could be the biophysical mechanism of *dreams*, which particularly implies their psychological significance: in dreams one has continuous access and more efficient "subjective" integration of normally conscious and unconscious contents, giving rise to integration and growth of human personality (otherwise divided into conscious and unconscious associative "ego" states), which results in alleviation of emotional conflicts [7-10]! Then *meditation*, as a prolonged altered state of consciousness, enables more efficient "subjective" integration of human personality, and is inevitably accompanied by a decay of ultradian rhythm, governing alterations of normal and altered states of consciousness (of periodicity ~ 1.5 -2 hours, in both waking and sleeping [11]). However, if a person bears strong internal psychic conflicts i. e. "ego states", the result of such a prolonged meditation will be integration of human personality around foregoing several "ego-states", with undesirable result of multiply divided (instead of well integrated) personality; competent teachers of meditation are fully aware of these perils, and do not recommend its accelerated practice to psychically weak persons (for whom the main priority being a reprogramming of psychic conflicts, we shall consider further on in the context of controlled transpersonal interactions in transitional states of consciousness).

The biophysical nature of *low-dielectric* ($\epsilon_r \geq \epsilon_r' \approx 1$) structure has also been analyzed: this structure could be related to partly displaceable (from the body) unhomogeneous ionic acupuncture system, which can conduct ULF brainwave currents $\sim 10^{-7}$ A, inside the conductive channels of the initial ionic concentration $\sim 10^{15}$ cm $^{-3}$, with a tendency of deterioration during a period of ~ 1 hour. Additionally, ionic acupuncture currents, and accompanying electromagnetic (EM) fields, have both ultralowfrequency (ULF) and microwave (MW) components, i. e. the very fast and very coherent quantum-like resonance MW component [12,13] is amplitude-modulated by significantly slower ULF component, which also support the EM/ionic "optical" MW/ULF quantum holographic neural network-like function of the acupuncture system, and its essential relation to consciousness, as strongly suggested from modeling of altered states of consciousness [7-9].¹ Hence, the displaced acupuncture EM/ionic "optical" MW/ULF quantum holographic neural network behaves as an ULF sensor, for continually inflowing information from the brain's neural networks to be "subjectively" recognized; also, it may behave as an optical sensor, which can perceive an environment extrasensory, as reported by reanimated persons [6].

2. TRANSITIONAL STATES OF CONSCIOUSNESS: BIOPHYSICAL BASIS OF MYSTICAL STATES

Even most peculiar spatio-temporal *transpersonal interactions* are predicted in *transitional* (nonstationary) states of interchange of normal and altered states of consciousness, when brainwaves traverse from high-dielectric ($\epsilon_r \gg 1$) to low-dielectric ($\epsilon_r \approx 1$) state or vice versa - the relative velocity $v = c_0 / \sqrt{\epsilon_r}$ of "subjective" reference frame being therefore subjected to abrupt change in short transitional period $\tau \sim 0.1$ s, with "subjective frame" acceleration $\sim c_0 / \tau \sim 10^9$ m/s 2 .

¹ In support of the ULF nature of ionic currents in acupuncture channels, one can cite the resonance ULF stimulation of the acupuncture analgesia endorphin (at ~ 4 Hz) and serotonin and/or norepinephrine (at ~ 200 Hz) mechanisms [14], as well as the efficiency of the German school of the resonance ULF therapy [15]; on the other hand, the evidence for the MW component of ionic acupuncture currents is provided by the efficiency of the Ukrainian-Russian school of the resonance MW (~ 30 -300 GHz) therapy [12,13]. The quantum-like coherent characteristics of the resonance MW therapy (sharply-resonant sensory response of the disordered organism, extremely low-intensity and low-energy non-thermal biologically efficient MW radiation, and negligible MW energy losses down acupuncture meridians) might be a consequence of the existence of biological nonlocal selfconsistent macroscopic quantum potentials [16], which can give rise to nonlinear coherent EM MW long-range maser-like excitations of biological nonlinear absorption medium with the cells as active centers - with acupuncture meridians related to eigenfrequencies and spatio-temporal eigenwaves distributions of every individual biological quantum system. This suggests that healthy condition might be considered as an absolute minimum (ground state) of the nonlocal selfconsistent macroscopic quantum potential of the organism, some disorders of an acupuncture system corresponding to higher minimums of the (spatio-temporally changeable) potential hypersurface in energy-configuration space [17], which possibly explains the higher sensory responses of the more excited (more disordered) acupuncture system, and poor MRT sensory response of the healthy acupuncture system being already in the ground state. Such a picture is very close to those of associative neural networks in their energy-configuration spaces [17], and to pattern recognition as convergence of the neural networks to the bottoms of the potential hypersurfaces, being the attractors of neural networks memory patterns [18,19]. This similarity of the quantum and neural network pictures might not be only superficial, as (real-valued) mathematical formalism of Hopfield's and Haken's associative neural network models [18] is analogical [19] to the (complex-valued) mathematical formalism of Feynman's propagator version of the Schrödinger equation [20]. This also supports the EM/ionic "optical" MW/ULF quantum holographic neural network-like function of the acupuncture system (similar to complex-valued oscillatory holographic Hopfield-like neural networks [19]), and its essential relation to (complex-valued quantum relativistic) consciousness, as strongly suggested from modeling of altered states of consciousness [8].

A deeper understanding of physical mechanisms of these processes obviously sinks into the General theory of relativity, as physical processes in highly accelerated reference frame outside gravitational field and in that one inside strong gravitational field with equal (gravitational) acceleration - are identical (so-called *Principle of equivalence*, being one of the fundamentals of both Newton's and Einstein's theories of gravitation). Theoretical analyses show [21] that in enormously strong gravitational fields so-called wormholes (or Einstein-Rosen space-time bridges) are created, whose entrance and exit could be in very distant space-time points. As in transitional states of consciousness the "subjective" reference frame, related to EM field of brainwaves, is subjected to quick change of velocity, with equivalent acceleration comparable with that one in enormously strong gravitational field of wormholes, according to the Principle of equivalence one could expect, in such brief states, the creation of the Einstein-Rosen bridge and tunneling of "subjective observer", i. e. consciousness, in previously "mentally addressed" exit in space-time² - reminiscences on passing through some tunnel being really reported by many patients reanimated from clinical death [6]. It should be pointed out that apart from the EM field, the displaced part of ionic acupuncture system (in the form of MW/ULF ionic neural network, having the "optical" sensory function), must also be tunneled in such (acausal) interactions of consciousness with distant events in space-time!

Hence, a space-time destination where a deceased ionic structure is tunneled at the moment of death, depends on the post-mortem mentally loaded addressing of the dying person. Therefore, it is quite reasonable that persons from different traditions, reanimated from clinical death, are reporting on bizarre spiritual contacts with the "light beings" identified as founders of their religious traditions (being mentally addressed as a target of prayer prior the near-death experience), or with a series of pleasant or unpleasant spiritual entities (contacts with them being induced by positively or negatively mentally loaded contents, successively activated in the deceased ionic structures), or with their close relatives (being a target of personal concern of the deceased) [6].

All these near-death experiences might be categorized into so called *astral projections* of consciousness, being described by rare practitioners as not subjected to spatio-temporal limitations [23,24] - quite in agreement with the transitional states of consciousness predicted by the model.

These astral projections are presumably also the basis of most *psychic phenomena* [25], providing also explanation for transitional nature and difficult reproducibility of these phenomena: they last only ~ 0.1 s, and spontaneous conditions for them are achieved only every 1.5-2 hours, with periodicity of ultradian rhythms which govern the interchange of normal and altered states of consciousness [11]. However, it should be noted that the non-low-dielectric barriers in interaction with the low-dielectric displaced ionic structures are helping in overcoming themselves in these astral projections - quite opposite to normal experience in usual mechanical interactions - enabling even their deliberate control and prolongation [23,24]! The predicted transitional states of consciousness could also be the biophysical basis of *anticipation*³ in

² To support this, one can cite the technique adopted by "psychics" when they want to exert some distant influence: they always intensely visualize the person or place, as mental targets! On the other hand, this could be deeply connected with the role of consciousness in quantum theory of measurement, where consciousness with its act of observation affects the final collapse of the initial wave function into one of possible probabilistic eigenstates - which implies that the collapse could be related with generation of local Einstein-Rosen bridge in highly noninertial processes of interactions of microparticles with measuring apparatuses [7-9], equivalent to strong gravitational effects of crucial importance for this process [22].

³ According to the computer experiments with random number generators [26], only nonactualized possible futures can be anticipated (more accurately for a priori greater probabilities of their realization), in accordance with quantummechanical viewpoint. It should be added that physical interaction of the displaced gaseous ionic "optical" MW/ULF neural network with possible "objective" system (described by possible wave function Ψ_i) or corresponding possible state of "collective consciousness" (Φ_i), in "astral projections" during transitional states of consciousness - opens also a question on the nature of wave functions - which should provide a picture of quantum-level physical reality (not only serving as a calculational device, useful merely for calculating probabilities, or as an expression of the experimenter's "state of knowledge" concerning physical system)! Then by changing initial state of "collective consciousness" (Φ) one can influence probabilities ($|a_i|^2$) of realization of corresponding states Φ_i , i. e. possible objective states Ψ_i (as the composite initial state of "objective" system and "collective" observer is a superposition of all possible composite states, $\Psi\Phi = \sum a_i \Psi_i \Phi_i$). As the very state of "collective consciousness" (Φ) is a composite state constituted of (noninteracting) states of all "individual consciousness" (φ_k), $\Phi_i \sim \prod \varphi_k$, it follows that the change of state φ_k of "individual consciousness" can affect the state Φ_i of "collective consciousness", and therefore the probabilities for realization of possible objective states Ψ_i . This is particularly true if the state Φ is very sensitive on small changes of initial conditions, which is the case for physical systems described by deterministic chaos [27]. Having in mind that the brain and corresponding state φ_k of "individual consciousness" is such kind of system, then the composite state Φ_i of "collective consciousness" is also described by deterministic chaos - and therefore very sensitive on small changes in initial conditions! Such a conclusion implies extraordinary practical significance of contents of our "individual consciousness", as they directly determine the probability of realization of possible objective states Ψ_i , i. e. the future events, no matter how bizarre this conclusion looks like [7-9]! In that context, what is actually anticipated in transitional states of "individual consciousness" might be [8,9] the evolved state of "collective consciousness" $\Phi_i(t)$ in some future moment t (to which "individual consciousness" has access, being the constitutional part of "collective consciousness"), which is quantummechanically described by deterministic unitary evolution governed by Schrödinger equation (or Dirac equation in relativistic case). However, the anticipated state $\Phi_i(t)$ could be redefined by changing initial state φ_k of "individual consciousness", leaving room for free will and the possibility for influence on the future. In this respect, it is quite possible that strong preferences in individual or collective futures exist, governed by karmical interpersonal loads, as it is claimed in Eastern tradition. Along the same line, it might also be possible that spiritual cleansing (by prayer or some other esoteric technique) is the efficient mechanism for changing initial state of several interrelated "individual consciousnesses", and hence "collective consciousness" thus changing anticipated preferences for both individual and collective futures [24,28].

intuition, precognition and deep creative insights - which could be easily put under control by “mental addressing” on the problem chosen, shortly before a waking-sleep transitional state! On awaking, the brain would then amplify the dream concerning the solution of the problem addressed, giving to it the priority in respect to other processed information during the sleep phase. The information obtained in this way is usually mixed through associative coupling with other conscious and unconscious pieces of information during the following REM-sleep periods - having therefore some symbolic form, which has to be decoded through introspective analysis of the dream. Naturally, to solve some scientific, technical or artistic problem in this way, it is necessary for the person to be expert in the field, in order to articulate the solution obtained in corresponding scientific, technical or artistic “language”.

The above mentioned astral projections of consciousness are presumably also the basis of *religious* experiences, with mental addressing on spatio-temporally displaced ionically abundant disembodied archetype structures from religious traditions, being mentally addressed as a target of prayer in transitional states of consciousness. So, it seems that efficiency of prayer in self-healing of inner psychological conflicts (caused by some previous interpersonal fights) might be the consequence of similar biophysical transpersonal interactions of the persons in conflict in transitional states of the praying person, accompanied by *mutual*⁴ reprogramming of interior conflicts (as a germ of the future interpersonal fights, as well as of potential psychosomatic and psychological disorders). That might provide an explanation for extraordinary efficiency of prayer accomplished shortly before sleeping which is recommended by all religious traditions (with direct mental addressing to the person in conflict, or energetically more efficient⁵ indirect mental addressing via ionically abundant

⁴ That could be possibly the reason for Christianity to insist on repenting and forgiving (“And forgive us our debts, as we forgive our debtors”, Mt. 6, 12), which represents a level of spiritual maturity of a person: this implies an obligation of spiritually mature persons to help in reprogramming conflicts by praying, even when themselves being victims of the conflicts (“But I say unto you, love your enemies, bless them that curse you, do good to them that hate you, and pray for them which despitefully use you, and persecute you”, Mt.5,44). It is not even allowed to see evil in fellow-men and condemn them (an old biblical commandment given to the man in paradise, forbidding to take food “of the tree of the knowledge of good and evil” - in fellow-men – “for in the day that you eat there-of you shall die” (Gen. 2, 17), whose violation has caused the Adam’s fall), insisting only on personal repenting and forgiving, as the only way in reprogramming psychic conflicts. So, it seems that here exists most space for free will in reprogramming personal wider (mental) environment, as anything else enhances the existing mental/emotional personal loads and enlarges stress in the world, dismissing an individual and humankind from the final spiritual ideal of healed (sinless/healthy) state of consciousness.

⁵ The displaced (outside the body) part of the ionic acupuncture system of the estimated initial ionic concentration $n_j \sim 10^{15} \text{ cm}^{-3}$ (supporting the ULF brainwave ionic currents $\sim 10^{-7} \text{ A}$) has a significant tendency of deterioration during a period of ~ 1 hour [7], as the partial ionic pressure at room temperature is much more greater than magnetic pressure which pinches the ionic channel; however, the stability condition of disembodied ionic structures could be met under equilibrium of the two pressures, when $n_j \sim 10^{24} \text{ cm}^{-3}$. It is obvious that this concentration exceeds by $\sim 10^9$ times that one in the displaced deteriorating ionic structure, and that greater would be the current flowing through the ionic channels ($I_0 \sim 100 \text{ A}$). That concentration is also $\sim 10^4$ times greater than bodily ionic concentration, which is obviously nonadapted and risky for direct contact with biological species, but not with those biological ionic structures displaced in transitional states of consciousness far beyond the body - which might be subjected to appropriate corrections of their (disordered) ionic distributions and concentration, causing after transitional state of consciousness (and returning of these structures inside the body) the positive backward effect on acupuncture ionic system of the individuals, and hence on their psychosomatic healing [7,8]. So, it seems that the healing process can be related with the transfer of ions (qi, prana, pneuma, ether...) and/or transfer of the MW/ULF EM information patterns, responsible for normal functioning of acupuncture system and overall health. In that context, it seems that other esoteric notions [24,29] such as subtle body (manomaya, lingasarira, manovijnana, ka, psyche, astral body, psychic body ...) and mental body (vijnanamaya, suksmasarira, manas, ba, thymos, mind, noetic body, ...) are biophysically inevitably associated with a partly displaced (from the body) ionic acupuncture system, and an EM component of ULF ionic currents embedded within it, respectively; on that line, the ionic condensations in the structured acupuncture system, with an EM component of ULF ionic currents embedded within it, behave like “distributed centers of consciousness” - this presumably being biophysical basis of yogic chakras [7-9].

Physiological significance of the chemical nature of (negative and positive) aeroions is still not clear. Russian investigations showed [30] that functional effect of ions of the same polarity but different chemical composition (small gaseous anions O_2^- , O_3^- , H_2O^- , ... and cations NO^+ , H_2O^+ , CO_2^+ , ..., heavy aqueous complexes of anions $\text{O}_2^- (\text{H}_2\text{O})_n$, ... and cations $\text{H}_3^+ \text{O} (\text{H}_2\text{O})_n$, ..., etc.) is basically equal, implying that aeroionic action is achieved by yielding its charge to biological object. However, it was also shown [31] that negative ions have physiological influence on the increase of tracheal ciliary rate in rabbits only in presence of O_2 in air, while positive ions have physiological influence on the decrease of tracheal ciliary rate in rabbits only in presence of CO_2 in air - implying possibly physiological significance of O_2^- and CO_2^+ aeroions in nostrils, as necessary precursors for dominating inhaling of negative aeroions by ida and positive aeroions by pingala (in their alternating ~ 1 hour active phases, respectively), with their corresponding terminations in left and right nostrils, in swara yoga physiology [32]. So, in nasal ida-phase (known also as Shakti, feminine, lunar, or alkaline phase [32], with left nostril activated, and whole left half of the body and right brain hemisphere too), in exhaling through (anabolic) ida in its nasal vicinity should dominate gaseous phase with less exhaled CO_2^+ and therefore relatively more gaseous O_2^- therein, which additionally stimulates dominant absorption of negative aeroions by active left nostril, supporting ida-phase backward; on the other hand, in nasal pingala-phase (known also as Shiva, masculine, solar, or acidic phase [32]), with right nostril activated, and whole right half of the body and left brain hemisphere too), in exhaling through (catabolic) pingala in its nasal vicinity should dominate gaseous phase with more exhaled CO_2^+ and therefore relatively less gaseous O_2^- therein, which additionally stimulates dominant absorption of positive aeroions by active right nostril, supporting pingala-phase backward. This picture is in accordance with the viewpoint of successive dominant flow of (negative) anions through the left circulatory part of the acupuncture system, and (positive) cations through the right circulatory part of the acupuncture system [17], with normal ultradian periodicity ~ 2 hours (i. e. ~ 1 -hour dominance for left and right phases, alternately: ida-pingala- ...[32]). Although this rhythm is not apparently in phase with ~ 24 -hour acupuncture rhythm of successive dominance of 12 paired meridians (i. e. ~ 2 -hour dominance for each organ-related meridian with corresponding yin or yang func-

disembodied archetype structures), when it is easiest to control the addressed mental contents prior the waking/sleeping transitional state!

This simultaneously offers a new insight in (psychosomatic) *health and illness* as essentially *transpersonal* phenomena, as the healing of some psychosomatic disorder (induced by interpersonal conflict) in only one person without *mutual* psychosomatic reprogramming is not final - as the non-reprogrammed interpersonal conflict in the other person causes its (unconscious) biophysical *transpersonal reinducement* in the first one, in mentally-loaded transitional states of consciousness of the second one.

Finally, as the EM field is only one out of four manifestations (electromagnetic, gravitational, weak and strong nuclear forces) of the unified physical field [37], it can be tentatively generalized that the *unified field* itself may be internal conscious display for various physical processes at different structural levels, from macroscopic cosmic to microscopic subnuclear ones [38]. As a consequence, one could conjecture that Nature itself has consciousness at different structural levels, both animate and inanimate, as it is widely claimed in esoteric traditional knowledge - which might be supported by analogous mathematical formalisms of Hopfield's holographic neural network dynamics and Feynman's version of the Schrödinger equation [19], implying similar information processing on both macroscopic biophysical and microscopic quantum levels. In that context, all local consciousness might be interconnected (through previously described interactions in altered and, especially, in *transitional states* of consciousness) making a *giant cosmic informational network with collective consciousness* [7-9], additionally supporting global significance of the individual moral behavior.

3. CONCLUSION

It is hereby demonstrated that the author's model of altered and (particularly!) transitional states of consciousness is an excellent biophysical framework for various states of consciousness described in religious and esoteric traditions of East and West, implying their real biophysical nature - and significance for understanding mechanisms of transpersonal mystical and other transitional states of consciousness.

Transitional character of mystical states also demonstrates why these phenomena are short-lasting and poorly reproducible, and also why they are most easily mentally controlled shortly before a waking/sleeping transitional state. This might be also explanation for extraordinary efficiency of *prayer* accomplished shortly before sleeping, which is recommended by all religious traditions, and its significance in *mutual reprogramming of psychic conflicts* (as a germ of the future interpersonal fights, as well as of potential psychosomatic and psychological disorders of the persons in conflict) during transpersonal interactions of the persons in conflict in transitional states of the praying person (with direct mental addressing on the person conflicted with, or *energetically more efficient* indirect mental addressing via ionically abundant disembodied archetype structures from religious traditions). This also offers a new insight in psychosomatic *health and illness* as essentially *transpersonal* phenomena, as the non-reprogrammed interpersonal conflict in the one person causes its (unconscious) transpersonal biophysical reinducement in the second one, in mentally-loaded transitional states of consciousness of the first one.

All this suggests that a deeper biophysical understanding of the nature of consciousness and transpersonal phenomena might soon give rise to scientific understanding and empirical verification of even fundamental philosophical/religious questions (like practical/spiritual significance of *imperative moral behavior* of every individual, extremely important for accelerated integration and spiritual evolution of personality) - and appearance of a *new/old humanism*, without meaningless and painful interpersonal, interethnic, and interreligious conflicts.

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tions in the following order: yin-yin-yang-yang-...[33]), it might be that every ~ 2-hour organ-related acupuncture phase (either yin or yang) needs complete ~ 2-hour nasal phase (ida-pingala) in order to balance activities of the corresponding organ-related pair of symmetrical left and right meridians, to enable both regenerative (anabolic, ida-like left meridian) and degradative (catabolic, pingala-like right meridian) organ functions, contributing finally to either yin or yang overall corresponding organ-effect from the viewpoint of Chinese traditional medicine [33].

It should be also repeated that ionic acupuncture currents, and accompanied EM fields, have both ultralowfrequency (ULF) and microwave (MW) components, i. e. the MW component is modulated by the ULF component (cf. footnote 1), and according to successes of the resonance MW therapy [12,13] acupuncture system might be considered [8,17] as a dynamic structure, assembled at the locations of maximums of three-dimensional standing waves, formed as a result of the reflection of coherent microwave (~ 100 GHz [34]) Fröhlich excitations of molecular subunits in the cell membranes and proteins, supported also by other investigations which suggest that gating and assembly of the intercell "gap junctions" (of higher density at acupuncture points and meridians [35]) is a dynamic process sensitive to electrochemical potential of the cell [36] - which might be therefore stimulated at spatio-temporal maximums of MW EM field of the organism [8,17]. In that context the explanation for efficiency of this method should be sought: some disorders in the organism give rise to deformation in the standing wave structure of the MW EM field of the organism, which influences corresponding changes in the spatio-temporal structure of the acupuncture system, and consequently resonance frequencies of its meridians, resulting in some disease; during the therapy, applying the MW source at corresponding acupuncture point the excited acupuncture system of the patient relaxes to the previous healthy condition, while reaching its normal frequency response upon the wide spectrum MW source - and following to physiological mechanisms of the acupuncture regulation [33] organism biochemically overcomes the disease.

REFERENCES

- [1] R. Hecht-Nielsen, *Neurocomputing* (Addison-Wesley, New York, NY, 1990).
- [2] E. R. John, Switchboard versus statistical theories of learning and memory, *Science* 177 (1972), pp. 850-864; E. R. John, T. Yang, A. B. Brill, R. Young, and K. Ono, Double-labeled metabolic maps of memory, *Science* 233 (1986), pp. 1167-1175; R. Eckhorn, R. Bauer, W. Jordan, M. Brosch, W. Kruse, M. Munk, and H. J. Reitboeck, Coherent oscillations: A mechanism of feature linking in the visual cortex?, *Biol. Cybern.* 60 (1988), pp. 121-130; C. M. Gray, P. Konig, A. K. Engel, and W. Singer, Oscillatory responses in visual cortex exhibit inter-columnar synchronization which reflects global stimulus properties, *Nature* 338 (1989), pp. 334-337; F. Crick and C. Koch, Towards a neurobiological theory of consciousness, *Seminars in the Neurosciences* 2 (1990), pp. 263-275; F. Crick, *The Astonishing Hypothesis. The Scientific Search for Soul* (Charles Scribner's Sons, New York, and Maxwell Macmillan International, 1994).
- [3] K. R. Poper and J. C. Eccles, *The Self and Its Brain* (Springer, Berlin, 1977), Chs. E2,8; B. J. Baars, *A Cognitive Theory of Consciousness* (Cambridge Univ. Press, Cambridge, MA, 1988).
- [4] In C. Tart, ed., *Altered States of Consciousness* (Academic, New York, 1972).
- [5] K. Jaspers, *Allgemeine Psychopathologie* (Springer, Berlin, 1953).
- [6] R. A. Moody, jr., *Life after Life* (Bantam, New York, 1975); W. Evans Wentz, *The Tibetan Book of the Dead* (Oxford Univ., London, 1968); Fr. Seraphim Rouz, *The Soul After Death* (St. Herman of Alaska Brotherhood, Platina, CA, 1980).
- [7] D. Raković, Neural networks, brainwaves, and ionic structures: Acupuncture vs. altered states of consciousness, *Acup. & Electro-Therap. Res., Int. J.* 16 (1991), pp. 88-99; D. Raković, Brainwaves, neural networks, and ionic structures: Biophysical model for altered states of consciousness, in D. Raković and Dj. Koruga, eds., *Consciousness: Scientific Challenge of the 21st Century* (ECPD, Belgrade, 1995), pp. 291-316; D. Raković, Hierarchical neural networks and brainwaves: Towards a theory of consciousness, in Lj. Rakić, G. Kostopoulos, D. Raković, and Dj. Koruga, eds., *Brain & Consciousness: Proc. ECPD Workshop* (ECPD, Belgrade, 1997), pp. 189-204; and references therein.
- [8] D. Raković, Biophysical basis of traditional medicine and traditional psychology, *Serbian Journal of Acupuncture* 1 (1998), pp. 6-12, in Serbian; D. Raković, Traditional medicine and traditional psychology: Biophysical bases of psychosomatic disorders and transpersonal stress reprogramming, in B. Lažetić and K. V. Sudakov, eds., *Basic and Clinical Aspects of the Theory of Functional Systems* (Medical Faculty, Novi Sad & P. K. Anokhin Institute of Normal Physiology RAMS, Moscow, 1998), pp. 161-167; and references therein; D. Raković and Z. Jovanović-Ignjatić, Microwave resonance therapy and acupuncture: New prospects for traditional medicine, *14th Symp. Acup. & Electro-Therap.*, October 22-25, 1998, New York.
- [9] D. Raković, Prospects for conscious brain-like computers: Biophysical arguments, *Informatica* 21 (1997), pp. 507-516; D. Raković, Consciousness and quantum collapse: Biophysics versus relativity, *The Noetic J.* 1 (1997), pp. 34-41; D. Raković and M. Dugić, Consciousness mediated quantum gravitational collapse via generated wormholes: From macroscopic biophysical to microscopic quantum arguments, in P. P. Wang, ed., *Proc. Joint Conf. Inform. Sci./Vol. 2: 3rd Int. Conf. Comput. Intell. & Neurosci.*, G. Georgiou, ed. (Assoc. for Intelligent Machinery, RTP, NC, 1998), pp. 265-268.
- [10] D. Raković, Neural networks versus brainwaves: A model for dream-like states of consciousness, *Proc. 14th Ann. Int. Conf. IEEE/EMBS* (1992), pp. 2651-2652.
- [11] R. Broughton, Human consciousness and sleep/waking rhythms, in B. B. Wolman and M. Ullman, eds., *Handbook of States of Consciousness* (Van Nostrand Reinhold, New York, 1986), pp. 461-484.
- [12] S. P. Sit'ko and L. N. Mkrtchian, *Introduction to Quantum Medicine* (Pattern, Kiev, 1994).
- [13] N. D. Devyatkov and O. V. Betskii, eds., *Biological Aspects of Low Intensity Millimeter Waves* (Seven Plus, Moscow, 1994).
- [14] B. Pomeranz, Acupuncture research related to pain, drug addiction and nerve regeneration, in B. Pomeranz and G. Stux, eds., *Scientific Bases of Acupuncture* (Springer, Berlin, 1989), pp. 35-52.
- [15] G. Fischer, *Grundlagen der Quanten-Therapie* (Hecataeus Verlagsanstalt, Triesenberg, 1996).
- [16] S. P. Sit'ko, Ye. A. Andreyev, and I. S. Dobronravova, The whole as a result of self-organization, *J. Biol. Phys.* 16 (1988), pp. 71-73; S. P. Sit'ko and V. V. Gizhko, Towards a quantum physics of the living state, *J. Biol. Phys.* 18 (1991), pp. 1-10; V. V. Gizhko and S. P. Sit'ko, Coherent microwave electromagnetic fields as a physical model of macroscopic quantum states of the multicellular organism, *Journal of Physics of the Alive* 1 (1993), pp. 103-109; S. P. Sit'ko, Quantum physics of the alive: Medical aspects, in Lj. Rakić, G. Kostopoulos, D. Raković, and Dj. Koruga, eds., *Brain & Consciousness: Proc. ECPD Workshop* (ECPD, Belgrade, 1997), pp. 171-177.
- [17] Z. Jovanović-Ignjatić and D. Raković, A review of current research in microwave resonance therapy: Novel opportunities in medical treatment, *Acup. & Electro-Therap. Res., The Int. J.* (1998), submitted.
- [18] J. J. Hopfield, Neural networks and physical systems with emergent collective computational abilities, *Proc. Natl. Acad. Sci. USA* 79 (1982), pp. 2554-2558; H. Haken, *Synergetic Computers and Cognition: A Top-Down Approach to Neural Nets* (Springer, Berlin, 1991).

- [19] M. Peruš, Neuro-quantum parallelism in mind-brain and computers, *Informatica* 20 (1996), pp. 173-183; M. Peruš, Multi-level synergetic computation in brain, *Advances in Synergetics* 9 (1998), in press; and references therein.
- [20] R. P. Feynman and A. R. Hibbs, *Quantum Mechanics and Path Integrals* (McGraw-Hill, New York, 1965); J. D. Bjorken and S. D. Drell, *Relativistic Quantum Fields* (McGraw-Hill, New York, 1965), Ch. 6.
- [21] K. S. Thorne, *Black Holes and Time Warps: Einstein's Outrageous Legacy* (Picador, London, 1994), Ch. 14, and references therein.
- [22] R. Penrose, *Shadows of the Mind, A Search for the Missing Science of Consciousness* (Oxford Univ. Press, Oxford, 1994), Part II, and references therein.
- [23] R. Monroe, *Journeys Out of the Body* (Doubleday & Co., Garden City (NY), 1971).
- [24] K. C. Markides, *Fire in the Heart. Healers, Sages and Mystics* (Paragon House, New York, 1990).
- [25] R. G. Jahn, The persistent paradox of psychic phenomena: An engineering perspective, *Proc. IEEE* 70 (1982), pp. 136-170.
- [26] D. I. Radin, Effects of a priori probability on PSI perception: Does precognition predict actual or probable futures, *J. Parapsych.* 52 (1988), pp. 187-212.
- [27] A. Babloyantz, Chaotic dynamics in brain activity, in E. Basar, ed., *Dynamics of Sensory and Cognitive Processing by the Brain* (Springer, Berlin, 1988), pp. 196-202.
- [28] Swami Rama, *Living with the Himalayan Masters* (Himalayan Int. Inst. of Yoga Sci. & Phil., Honesdale, PA, 1978).
- [29] K. Wilber, *The Atman Project* (Quest, Wheaton (IL), 1980); P. Vujičin, States of consciousness in esoteric practice, in D. Raković and Dj. Koruga, eds., *Consciousness: Scientific Challenge of the 21st Century* (ECPD, Belgrade, 1995), pp. 87-134, and references therein.
- [30] L. L. Vasilyev, *Theory and Practice of Aeroionic Therapy* (Leningrad, 1951), in Russian; L. L. Vasilyev, *Influence of Aeroions on Organism* (Leningrad, 1960), in Russian; A. A. Minkh, *Air Ionization and Its Hygienic Significance* (Medgiz, Moscow, 1963), in Russian; A. A. Shilkin, Yu. D. Gubernskii, and A. M. Mironov, *Aeroionic Regime in Buildings* (Stroyizdat, Moscow, 1988), in Russian.
- [31] A. P. Krueger and R. F. Smith, Effects of gaseous ions on tracheal ciliary rate, *Proc. Soc. Exp. Biol.* 98 (1958), pp. 412-414.
- [32] H. Johari, *Breath, Mind, and Consciousness* (Destiny Books, Rochester, Vermont, 1989).
- [33] Y. Omura, *Acupuncture Medicine* (Japan Publ. Inc., Tokyo, 1982).
- [34] H. Fröhlich, Long-range coherence and energy storage in biological systems, *International Journal of Quantum Chemistry* 2 (1968), pp. 641-649; H. Fröhlich, Theoretical physics and biology, in H. Fröhlich, ed., *Biological Coherence and Response to External Stimuli* (Springer, New York, 1988).
- [35] V. F. Mashansky, Yu. V. Markov, V. H. Shpunt, S. E. Li, and A. S. Mirkin, Topography of gap junctions in human skin and its possible role in non-nervous transition of information, *Archive of Anatomy, Histology, and Embriology* 84, 3 (1983), pp. 53-60, in Russian; S. E. Li, V. F. Mashansky, and A. S. Mirkin, Lowfrequency wave and vibrational processes in biosystems, in K. V. Frolov, ed., *Vibrational Biomechanics. Using Vibrations in Biology and Medicine, Part I: Theoretical Bases of Vibrational Biomechanics* (Nauka, Moscow, 1989), Ch.3, in Russian.
- [36] E. R. Kandel, S. A. Siegelbaum, and J. H. Schwartz, Synaptic transmission, in E. R. Kandel, J. H. Schwartz, and T. M. Jessell, eds., *Principles of Neural Science* (Elsevier, New York, 1991), Ch. 9; M. V. L. Bennett, L. C. Barrio, T. A. Bargiello, D. C. Spray, E. Hertzberg, and J. C. Ssez, Gap junctions: New tools, new answers, new questions, *Neuron* 6 (1991), pp. 305-320.
- [37] J. H. Schwarz, Superstrings, *Physics Today*, Nov. 1987, pp. 33-40.
- [38] J. S. Hagelin, Is consciousness the unified field? A field theorist's perspective, *Modern Sci. & Vedic Sci.* 1 (1987), pp. 29-88, and references therein.