

QUANTUM AND CLASSICAL HOPFIELD-LIKE NEURAL NETWORKS: TWO MODES OF CONSCIOUSNESS AND PSYCHOLINGUISTIC AND PSYCHOTHERAPEUTIC IMPLICATIONS

Dejan Raković^{1,2}

¹Faculty of Electrical Engineering, Belgrade, Serbia and Montenegro, rakovicd@etf.bg.ac.yu

²International Anti-Stress Center (IASC), Belgrade, Serbia and Montenegro, www.iasc-bg.org.yu

Abstract

Quantum bases of consciousness and free will are considered with implications of two cognitive modes of consciousness (direct religious/creative, characteristic of quantum-coherent transitional and altered states of consciousness, and indirect perceptually/rationally mediated, characteristic of classically-reduced normal states of consciousness), as well as conditions of transformations of one mode into another, and related psycholinguistic and psychotherapeutic implications - by applying theoretical concepts of associative neural networks and quantum neural holography combined with quantum decoherence theory.

1. Introduction

The prevailing scientific paradigm considers information processing within the central nervous system as occurring through *hierarchically organized and interconnected neural networks* [1-3]. It seems that this hierarchy of biological neural networks is going down subcellular *cytoskeleton* level, being according to some scientists a kind of interface between *neural* and *quantum* level [4] - the last one having within the Feynman propagator version of Schrödinger equation *analogous* mathematical formalism as the Hopfield associative neural network [2]. The mentioned analogy opens additional fundamental question how *quantum* parallel processing level gives rise *classical* parallel processing one, which is a general problem of relationship between quantum and classical levels within the *quantum decoherence theory* as well [5]; naturally, the same question is closely related to fundamental nature of *consciousness*, whose indeterministic manifestations of *free will* [6-8], and other *holistic manifestations* of consciousness, like transitional states [8] and altered states of consciousness [9], conscious/unconscious transitions and consciousness pervading body [10] - necessarily imply that some manifestations of consciousness must have deeper *quantum origin*, with significant *psychosomatic implications*.

Namely, as demonstrated by *quantum-coherent characteristics* of the Russian-Ukrainian school of *microwave resonance therapy* (MRT) [11,12], the *acupuncture system* is the only *macroscopic quantum system* in our body (while brain still seems not to be [13]) which might be related to *consciousness* [14]; and as recent investigations show that any quantum system has formal mathematical structure of *quantum-*

holographic associative neural network [2] - then (acupuncture temporary-reprogrammable [15,16]) *memory attractors of the quantum-holographic acupuncture-meridian network* can be treated as *psychosomatic individual disorders* representing (*quantum*)*holistic microwave records* - which might represent biophysical basis of (*quantum*)*holistic local psychosomatics* [8,15,17]! At the same time, the mentioned analogy between mathematical formalisms of *Hopfield's associative neural network* and *Feynman's propagator version of the Schrödinger equation* implies that *collective consciousness* is possible *ontological property of the physical field itself* [8,15] with various microquantum and macroquantum (both nonbiological and biological) excitations, which is widely spread thesis of *Eastern esoteric/religious traditions* [18] - and then *memory attractors of the quantum-holographic space-time network of collective consciousness* can be treated as *psychosomatic collective disorders* representing (*quantum*)*holistic field records* (including interpersonal hesychastic-prayer finally-reprogrammable loads [15,19]) - which might represent biophysical basis of (*quantum*)*holistic global psychosomatics* [8,15,17]!

So it seems that the *whole psychosomatics is quantum hologram*, both on the level of individual and collective consciousness, which resembles on Hinduistic relationship Brahman/Atman, as wholeness and its part which bears information about wholeness [18]. The mentioned quantum-holographic picture also implies that quantum-holographic hierarchical parts carry information on wholeness, enabling subtle *quantum-holographic fractal coupling* between different hierarchical levels: acupuncture-based-quantum-informational control of ontogenesis and morphogenesis, starting from the first fertilized cell division which initializes differentiation of the acupuncture system of (electrical synaptic) "gap-junctions" [20]; quantum-holographic-language-influence on the expression of genes [21]; and fractal-information coupling of different hierarchical levels in Nature [22].

In the following, we shall focus particularly on the *quantum bases* of consciousness and free will, the related two cognitive modes of consciousness, conditions of transformations of one cognitive mode into another, and psycholinguistic and psychotherapeutic implications.

2. Quantum and classical neural nets for modeling two modes of consciousness

Really, we may speak of *two cognitive modes* of individual consciousness [8,15]: the quantum-coherent direct one (religious/creative, in altered and transitional states of consciousness) and the classically-reduced indirect one (perceptually/rationally mediated, in normal states of consciousness) - to which theoretical methods of associative neural networks and quantum neural holography [2] combined with quantum decoherence theory [23] might be applied. These cognitive modes of individual consciousness are presumably interchanged by periodicity of ~ 2 -hour *ultradian rhythm*, both in waking and sleep states [24], which according to quantum-relativistic/quantum-holographic model of consciousness [8] might be the cause of corresponding subjective changes in altered states of consciousness (with relativistic dilations of subjective time sense and mixing of normally conscious and unconscious contents), and transpersonal quantum-gravitational tunneling of the electromagnetic (EM)/ionic out-of-body displaced part of individual consciousness in highly noninertial transitional states of consciousness (without space-time barriers, closely related to quantum-gravitational nonlocal role of (generalized field-related collective) consciousness in the *wave function quantum collapse* [8,15]).

The *direct cognitive mode* of individual consciousness may be related to weakly coupled consciousness-environment communication, within the nonlocal quantum-holographic/quantum-gravitational space-time network of collective consciousness (characteristic of quantum-coherent *transitional and altered states of individual consciousness*, in religious-esoteric transpersonal communications, of the quantum-gravitationally tunneled quantum-holographic-Hopfield-like EM/ionic out-of-body displaced part of the acupuncture network of individual consciousness, with the mentally addressed nonlocal environment-target, including anticipation in intuition, precognition, and deep creative insights [8,15] - being after quantum collapsing in classical/normal state of consciousness, through restituted strong coupling of quantum-holographic-consciousness-contents with the body, further subjected to indirect language/artistic/scientific filtering through extended reticular-thalamic activated system, ERTAS [3], thus classically-reducing initially obtained direct quantum-coherent information content - so explaining *generally poor* informational rationalization of the initial full quantum-holographic awareness of spiritual/religious mystical experiences).

The *indirect cognitive mode* of individual consciousness may be related to strongly coupled consciousness-body-environment communication via space-time limited perceptual sensations, further processed by classical/electrochemical hierarchical neural networks and rationally filtered in conscious content by approximate empirical/artistic/scientific concepts dependent of cultural/scientific tradition and education of the inhabitants of some society (characteristic of classically-reduced *normal states of*

individual consciousness in everyday communications, additionally *filtered* and amplified by ERTAS system - and afterwards transcribed in conscious content of the quantum-informational acupuncture network of individual consciousness, via 'brainwaves' EM fields every ~ 0.1 s - so generating normal "stream of consciousness" [8]).

More concretely, in approximation of almost non-interacting individual consciousnesses S_k , the state of collective consciousness S is $|\Phi\rangle_S \sim \prod_k |\phi^k\rangle_{S_k}$. Here

the quantum-coherent state of k -th individual consciousness, $|\phi^k\rangle_{S_k} = \sum_i C_{k_i} |\phi^{k_i}\rangle_{S_k}$, is described

by superposition of its all possible states (ϕ^{k_i}), which after quantum collapsing in classically-reduced state gives rise to stochastic state described by density

matrix $\tilde{\rho}_{S_k}^k = \sum_i |C_{k_i}|^2 |\phi^{k_i}\rangle_{S_k S_k} \langle \phi^{k_i}|$, with

probabilities $|C_{k_i}|^2$ of the realization of one of the classically decoherent states $|\phi^{k_i}\rangle_{S_k}$ - in quantum

measurement-like process upon the initial quantum-coherent state $|\phi^k\rangle_{S_k}$. The time evolution $|\phi^k(t)\rangle_{S_k}$ of

the quantum-coherent state of k -th individual consciousness might be described in Feynman's representation by quantum-holographic Hopfield-like neural network [2,15], while the time evolution $\tilde{\rho}_{S_k}^k(t)$

of the classically-reduced stochastic state of k -th individual consciousness might be described by classical Hopfield-like neural network [1,15], represented by changes in the shape of the potential hypersurface in the acupuncture energy-state space $(E_{S_k}, |\phi^k\rangle_{S_k})$

achieved by exciting consciousness/acupuncture system S_k from initial *stationary classically-reduced state*

$\tilde{\rho}_{S_k}^k = \sum_i |C_{k_i}|^2 |\phi^{k_i}\rangle_{S_k S_k} \langle \phi^{k_i}|$ via intermediate *non-stationary quantum-coherent superposition* $|\phi^{k'}\rangle_{S_k} =$

$\sum_i C'_{k_i} |\phi^{k_i}\rangle_{S_k}$ into subsequent final *stationary classically-*

reduced state $\tilde{\rho}_{S_k}^{k''} = \sum_i |C''_{k_i}|^2 |\phi^{k_i}\rangle_{S_k S_k} \langle \phi^{k_i}|$, with $|C''_{k_i}|^2 \neq |C_{k_i}|^2$ [23].

3. Transformations of consciousness modes

The above-mentioned division in *two cognitive modes* of individual consciousness, *quantum-coherent direct one* (in religious/creative altered and transitional states of consciousness) and *classically-reduced indirect one* (in perceptually/rationally mediated *normal states of consciousness*) - is still non-quite sharp.

Namely, in religious/creative *altered and transitional states of consciousness*, quantum-coherent direct mode might be *transformed* into classically-reduced indirect mode, in the case of strong out-of-body interaction consciousness-environment, with quantum-reduced out-of-body *extrasensory perception of the mentally addressed environment*, which transforms out-of-body displaced EM/ionic part of individual consciousness from nonstationary quantum-coherent state of the quantum-holographic Hopfield-like neural network into above described stationary classically-reduced stochastic state of the classical Hopfield-like neural network. After interruption of this interaction, with returning out-of-body displaced EM/ionic part of individual consciousness in quantum-gravitationally mentally-channeled tunneling of the displaced part of individual consciousness upon its body, this information is further transcribed through microwave/ultralowfrequency (MW/ULF) EM interaction acupuncture system/nervous system and afterwards language/artistic/scientific filtered and amplified by the brain hierarchical neural ERTAS system (with accompanied neuron-like oscillatory [25] "brainwave frequency" ascending thought from lower-frequency ULF (δ , θ) unconscious form of subliminal thought to higher-frequency ULF (α , β , γ) conscious form, pointing at the very mechanism of thinking [26], closely related to the mechanism of frontolimbic-amplification of the pragmatic language processing [27], which is dominantly going on the unconscious level). It should be also pointed out that mentioned (MW/ULF) EM *acupuncture system/nervous system interaction* has its threshold potential of the nervous electrochemical synapses (in contrast to practically non-existing threshold potential of the acupuncture electrical "gap-junction" synapses [8,17,20], which makes bodily acupuncture system an extremely sensitive quantum sensor) and therefore filters all thus extrasensory obtained information below nervous threshold potential, preventing it to be additionally language/artistic/scientific articulated by the brain hierarchical neural ERTAS system - enabling further processing of only that information which is sufficiently "emotionally colored" i.e. has sufficient critical depth of MW/ULF EM acupuncture memory attractors, or has greater general acupuncture energetic potential (inborn or gained through various traditional techniques of stimulation, deep breathing, relaxation, meditation or prayer [17]).

On the other hand, the reverse *nervous system/acupuncture system interaction* - effective in transcription of language/artistic/scientific articulated brain information into conscious content of the acupuncture network of individual consciousness, mediated by ULF EM field of brain neural activities every ~ 0.1 s thus generating normal "stream of consciousness" and ULF-modulating acupuncture MW-memory attractors - is going *without threshold limits*. In this context, in perceptually/rationally mediated *normal states of consciousness*, the classically-reduced indirect mode can be *transformed* into quantum-coherent direct mode of individual consciousness after ULF EM transcription of the brain articulated information

into conscious content during interaction nervous system/acupuncture system, in the case of short-lasting *nonstationary excitations of acupuncture system* in interactions with strongly changing environment [23] - like MRT or other types of acupuncture stimulation, inhalation of the air ions in deep yoga breathing and their redistribution over acupuncture system, different meditative and other psycho-muscular relaxation techniques, stressful situations, transitional and altered states of consciousness [17] - which transform the acupuncture system from stationary classically-reduced stochastic state of classical Hopfield-like neural network into nonstationary quantum-coherent state of quantum-holographic Hopfield-like neural network, which then collapses into following stationary classically-reduced state. This might be a model of perceptually/rationally induced strong intentional classical/quantum/classical stationary/nonstationary/stationary hierarchical (inter) actions nervous/acupuncture/nervous systems - i.e. model of *free will*.

4. Psycholinguistic and psychotherapeutic implications

Finally, the elaborated consciousness-body-environment communication, weakly-coupled (via non-space-time-limited quantum-gravitationally out-of-body-displaced EM/ionic (part of) acupuncture system in transitional and altered states of individual consciousness, subsequently quantum-collapsed in restituted-strongly-coupled classical/normal state of consciousness, and then subjected to both acupuncture system/nervous system threshold-filtering and hierarchical nervous ERTAS filtering-and-amplifying interactions) and/or strongly-coupled (via space-time limited neural-networks-processed perceptual sensations in normal states of consciousness, subjected to hierarchical nervous ERTAS filtering and amplifying) - combined with unconscious language modulation of thought - might provide fundamental information on the relationship between consciousness and thinking, simultaneously contributing to improvement and development of new *psycholinguistic techniques* of contextual learning in general, related to unconscious information processing and memorizing.

Namely, ERTAS-like mechanism of pragmatic processing, in combination with the increase of dominant EEG frequency from δ to β brainwaves during an ontogenesis [28], implies that the mother tongue is generally memorized at low-frequency δ and θ levels (later being unconscious in adults), in contrast to second and even further languages in bilinguals and multilinguals which are memorized at high-frequency α , β , and γ levels (later being conscious in adults) - which then implies that second and further languages are being hardly incorporating at unconscious (automatic) levels, save only from contextual learning which enables unconscious processing of contexts - providing differences of the *language learning* in childhood and adulthood as well as in school (conscious/grammatical *noncontextual*), and in living environment (unconscious/nongrammatical *contextual*) [26].

Particularly, this might have significant *psychotherapeutic implications* as well: it can account for excellent prophylactic characteristics of *autogenic training*, as the most contemporary method of medical relaxation, which helps contextual messages to be associatively memorized at the subconscious level, from where they contribute to softening of undesired psychosomatic reactions on everyday stressful situations [26]; also, the resolving of psychological conflicts by individual *psychotherapeutic practices* can be understood as a recognition of the origin of unconscious conflict and its ascending to higher-frequency conscious level, thus diminishing previous lower-frequency unconscious conflicting associative memory state and its role in unconscious generation of subliminal thoughts, and enabling further integration of personality around healthy associative memory ego-state [26]; finally, essential transpersonal aspect of psychological conflicts and unavoidable necessity of their simultaneous transpersonal reprogramming in all persons involved (relatives/enemies/deceased) in merciful-prayer-based *Christian religious practices* should be stressed, contributing to their radical and final reprogramming at the level of spatio-temporal associative memory network of collective consciousness in prayer-channeled non-space-time limited transitional states of consciousness [8,15].

5. Conclusions

In this paper, *quantum bases of consciousness* and *free will* are considered with implications of *two cognitive modes of individual consciousness* (the quantum-coherent direct one and the classically-reduced indirect one) - to which theoretical methods of associative neural networks and quantum neural holography, combined with quantum decoherence theory, might be applied.

The *direct cognitive mode* of individual consciousness might be related to weakly coupled consciousness-environment communication, within the nonlocal quantum-holographic/quantum-gravitational Hopfield-like space-time network of collective consciousness (characteristic of quantum-coherent transitional and altered states of individual consciousness in religious-esoteric transpersonal communications, including anticipation in intuition, precognition, and deep creative insights), while the *indirect cognitive mode* of individual consciousness might be related to strongly coupled consciousness-body-environment communication via space-time limited perceptual sensations, further processed by classical/electrochemical hierarchical neural networks and rationally filtered in conscious content by approximate empirical/artistic/scientific concepts dependent of cultural/scientific tradition and education of the inhabitants of some society (characteristic of classically-reduced normal states of individual consciousness in everyday communications - being *in principal classically-informationally-reduced* in comparison to *quantum-holographic-informationally-complete* awareness of spiritual/religious mystical experiences).

Conditions of transformations of one mode into another are also considered, with related significant unconscious-contextual *psycholinguistic implications* of relationship between consciousness and thinking, contributing to improvement and development of new techniques of contextual learning in general, and having significant *psychotherapeutic implications* as well, in theoretical understanding and practical applications of the mechanisms of autogenic training, individual psychotherapeutic and transpersonal Christian religious practices.

6. References

- [1] Hopfield, J. J.; Neural networks and physical systems with emergent collective computational abilities; *Proc. Natl. Acad. Sci. USA*, 79:2554-2558, 1982; Kohonen, T.; *Self-Organization and Associative Memory*; Springer, Berlin, 1984; Amit, D.; *Modeling Brain Functions: The World of Attractor Neural Nets*; Cambridge Univ. Press, Cambridge, 1989; Haken, H.; *Synergetic Computers and Cognition: A Top-Down Approach to Neural Nets*; Springer, Berlin, 1991.
- [2] Peruš, M.; Neuro-quantum parallelism in mind-brain and computers; *Informatica*, 20:173-183, 1996; Peruš, M. and Dey, S. K.; Quantum systems can realize content-addressable associative memory. *Appl. Math. Lett.*, 13(8):31-36, 2000; Peruš, M.; Multi-level synergetic computation in brain, *Nonlinear Phenomena in Complex Systems*, 4:157-193, 2001; Peruš, M., Bischof, H., and Kiong, L. C.; Quantum-implemented selective reconstruction of high-resolution images, www.arxiv.org/abs/quant-ph/0401016, 2004.
- [3] Popper K. R. and Eccles, J. C.; *The Self and Its Brain*; Springer, Berlin, 1977; Baars, B. J.; *A Cognitive Theory of Consciousness*; Cambridge Univ. Press, Cambridge, MA, 1988; Raković, D.; *Fundamentals of Biophysics*; Grosknjiga, Belgrade, 1995, Chs. 5-6, in Serbian.
- [4] Hameroff, S. R.; Quantum coherence in microtubules: A neural basis for emergent consciousness? *J. Consciousn. Stud.*, 1:91-118, 1994; Koruga, Dj.; Information physics: In search of a scientific basis of consciousness, in D. Raković and Dj. Koruga, eds., *Consciousness: Scientific Challenge of the 21st Century*; ECPD, Belgrade, 1995.
- [5] Giulini, D., Joos, E., Kiefer, C., Kupsch, J., Stamatescu, I.-O., and Zeh, H. D.; *Decoherence and the Appearance of a Classical World in Quantum Theory*; Springer, Berlin, 1996.
- [6] Von Neumann, J.; *Mathematical Foundations of Quantum Mechanics*; Princeton Univ. Press, Princeton, NJ, 1955.
- [7] Stapp, H. P.; Quantum theory and the role of mind in nature, *Found. Phys.*, 2001, preprint; Stapp, H.; *Mind, Matter, and Quantum Mechanics*; Springer, New York & Berlin, 1993.

- [8] Raković, D.; 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; Raković, D.; Prospects for conscious brain-like computers: Biophysical arguments, *Informatica (Special Issue on Consciousness as Informational Phenomenalism)*; 21:507-516, 1997; Raković, D.; Transitional states of consciousness as a biophysical basis of transpersonal transcendental phenomena, *Int. J. Appl. Sci. & Computat.*; 7:174-187, 2000.
- [9] In C. Tart, ed.; *Altered States of Consciousness*; Academic, New York, 1972.
- [10] Shimony, A.; in R. Penrose, A. Shimony, N. Cartwright, and S. Hawking, eds.; *The Large, the Small and the Human Mind*; Cambridge Univ. Press, Cambridge, 1995.
- [11] Devyatkov, N. D.; Influence of the millimeter wavelength range electromagnetic radiation upon biological objects, *Soviet Physics - Uspekhi*, 110: 452-469, 1973; N. D. Devyatkov and O. Betskii, eds.; *Biological Aspects of Low Intensity Millimeter Wave*; Seven Plus, Moscow, 1994.
- [12] Sit'ko, S. P., Andreyev, Ye. A., and Dobronravova, I. S.; The whole as a result of self-organization, *J. Biol. Phys.*, 16:71-73, 1988; Sit'ko, S. P. and Gizhko, V. V.; Towards a quantum physics of the living state, *J. Biol. Phys.*, 18:1-10, 1991; Sit'ko, S. P. and Mkrтчian, L. N.; *Introduction to Quantum Medicine*; Pattern, Kiev, 1994.
- [13] Tegmark, M.; Importance of quantum decoherence in brain processes, *Phys. Rev. E*, 61: 4194-4206, 2000.
- [14] An additional support that acupuncture system is really related to consciousness is provided by novel *meridian (psychoenergetic) therapies*, with very fast removing of persistent phobias, allergies and other psychosomatic disorders (see Callahan, R. J. and Callahan, J.; *Thought Field Therapy and Trauma: Treatment and Theory*; Indian Wells, CA, 1996; Callahan, R. J.; The impact of thought field therapy on heart rate variability (HRV), *J. Clin. Psychol.*; Oct. 2001, www.interscience.Wiley.com; Mihajlović Slavinski, Ž.; *PEAT and Neutralization of Primeval Polarities*; Belgrade, 2000, in Serbian) - whose simultaneous effects of *visualization of the psychosomatic problems and tapping/touching of some acupuncture points* might be interpreted as a "smearing" of memory attractors of the psychosomatic disorders, through successive imposing of new boundary conditions in the acupuncture energy-state space during visualizations of the psychosomatic problems [15].
- [15] Raković, D., Dugić, M., and Ćirković, M. M.; Macroscopic quantum effects in biophysics, *NeuroQuantology* (www.NeuroQuantology.Su.com) 2(4):237-262, 2004; Raković, D.; Biophysical bases and frontiers of (quantum) holistic psychosomatics, in: V. Jerotić, Dj. Koruga, and D. Raković, eds.; *Science - Religion - Society*; Theological Faculty of Serbian Orthodox Church & Serbian Ministry of Religions, Belgrade, 2002, in Serbian; Raković, D.; Hopfield-like quantum associative neural networks and (quantum) holistic psychosomatic implications, in: B. Reljin and S. Stanković, eds.; *Proc. NEUREL-2002*; IEEE Yugoslavia Section, Belgrade, 2002; Raković, D. and Dugić, M.; Quantum and classical neural networks for modeling two modes of consciousness: Cognitive implications, in: B. Reljin and S. Stanković, eds.; *Proc. NEUREL-2004*; IEEE Yugoslavia Section, Belgrade, 2004.
- [16] According to *Tibetan traditional medicine*, an acupuncture procedure must be repeated every several months - presumably as a consequence of restituted patient's mental loads from his mental-transpersonal-environment of closely related family members and enemies, that remained non-reprogrammed on the level of quantum-holographic collective consciousness [15], which might be supported by Tibetan pulse diagnostics based on 20 pulses, enabling precise diagnosis of psychosomatic disorders not only of the patient himself but also of his family members and enemies (see Petrović, S.; *Tibetan Medicine*; Narodna knjiga - Alfa, Belgrade, 2000, in Serbian).
- [17] Jovanović-Ignjatić, Z. and Raković, D.; A review of current research in microwave resonance therapy: Novel opportunities in medical treatment, *Acup. & Electro-Therap. Res., The Int. J.*; 24:105-125, 1999; Raković, D., Jovanović-Ignjatić, Z., Radenović, D., Tomašević, M., Jovanov, E., Radivojević, V., Martinović, Ž., Šuković, P., Car, M., and Škarić, L.; An overview of microwave resonance therapy and EEG correlates of microwave resonance relaxation and other consciousness altering techniques, *Electro-and Magnetobiology*; 19:193-220, 2000; Raković, D.; Biophysical bases of the acupuncture and microwave resonance stimulation, *Physics of the Alive*; 9:23-34, 2001.
- [18] Wilber, K.; *The Atman Project*; Quest, Wheaton, IL, 1980; Vujićin, P.; States of consciousness in esoteric practice, in: D. Raković and Dj. Koruga, eds., *Consciousness: Scientific Challenge of the 21st Century*; ECPD, Belgrade, 1995, and references therein.
- [19] Vlahos, J.; *Orthodox Psychotherapy: The Holy Fathers Science*; Orthodox Missionary School of St. Alexander Nevskiy Church, Belgrade, 1998, Serbian translation from Greek.
- [20] Djordjević, D.; *Electrophysiological Research of Reflexotherapy Mechanisms*; M. Sc. Thesis in

- Medicine, University of Belgrade, 1995, in Serbian, Chs. 1.2 and references therein.
- [21] Popular survey of the mentioned Russian research on quantum-holographic influence of the language communication on the expression of genes is given in DNA's hyper communication: The "Living Internet" inside of us; www.fosar-bludorf.com.
- [22] On *fractal-information coupling of hierarchical levels* in Nature, see the articles by Rakočević, M.; The universal consciousness and the universal code; and Koruga, Dj.; Information physics: In search of a scientific basis of consciousness; in: D. Raković and Dj. Koruga, eds.; *Consciousness: Scientific Challenge of the 21st Century*, ECPD, Belgrade, 1995; and Ng, Y. J.; From computation to black holes and space-time foam, *Phys. Rev. Lett.*, 86:2946-2949, 2001, as well as the book by Plichta, P.; *God's Secret Formula*; Element Books, Shaftesbury, 1997. For most fascinating manifestation of *global quantum-holographic coupling* on the level of preferences of collective and individual history coded within The Old Testament, see the paper by Witztum, D., Rips, E., and Rosenberg, Y.; Equidistant letter sequences in The Book of Genesis, *Statistical Science*, 9:429-438, 1994, as well as the books by Drosnin, M.; *The Bible Code*; Simon & Schuster, New York, 1997 and Drosnin, M.; *Bible Code II: The Countdown*; Viking Penguin, New York, 2002 - which might be interpreted as a consequence of the quantum-holographic nature of the cosmic collective consciousness (God!?) and its every original manifestation (including The Old Testament, as well as every individual consciousness) - which still does not mean the strict determinism of the History by the existing state of collective consciousness, whose memory attractors could be reprogrammed by hesychastic prayer for the others thus removing interpersonal loads of the quantum-holographic Hopfield-like neural network of collective consciousness - so leaving the room for free will and influence on the future preferences [8,15].
- [23] Raković, D. and Dugić, M.; A critical note on the role of the quantum mechanical 'collapse' in quantum modeling of consciousness; *Informatica*, 26:85-90, 2002; Raković, D. and Dugić, M.; Quantum and classical neural networks: Implications for modeling psychosomatic and cognitive functions, in: S. Jovičić and M. Sovilj, eds.; *Speech and Language: Interdisciplinary Research of Serbian Language I*; IEFPG, Belgrade, 2004, in Serbian; Raković, D., Dugić, M., and Plavšić, M.; The polymer conformational transitions: A quantum decoherence theory approach, *Materials Science Forum*, 453-454:521-528, 2004; Raković, D., Dugić, M., and Plavšić, M.; Biopolymer chain folding and biomolecular recognition: A quantum decoherence theory approach, *Materials Science Forum*, 2005, in press; Dugić, M., Raković, D., and Plavšić, M.; The polymer conformational stability and transitions: A quantum decoherence theory approach, in: A. Spasić and J.-P. Hsu, eds.; *Finely Dispersed Particles. Micro-, Nano-, and Atto-Engineering*, Marcel Dekker, New York, 2005, in press.
- [24] Broughton, R.; Human consciousness and sleep/waking rhythms, in B. B. Wolman and M. Ulman, eds.; *Handbook of States of Consciousness*; Van Nostrand Reinhold, New York, 1986.
- [25] Ellias, S. A. and Grossberg, S.; Pattern formation, contrast control, and oscillations in the short term memory of shunting on-center off-surround networks, *Biological Cybernetics*, 20:69-98, 1975.
- [26] Raković, D.; Hierarchical neural networks and brainwaves: Towards a theory of consciousness, in: Lj. Rakić, G. Kostopoulos, D. Raković, and Dj. Koruga, eds.; *Brain and Consciousness: Proc. ECPD Workshop*; ECPD, Belgrade, 1997; Raković, D.; On brain's neural networks and brainwaves modeling: Contextual learning and psychotherapeutic implications, in: B. Lithgow and I. Cosic, eds.; *Biomedical Research in 2001: Proc. 2nd IEEE/EMBS (Vic)*; IEEE/EMBS Victorian Chapter, Melbourne, 2001; Raković, D.; Thinking and language: Maturation of EEG and model of contextual language learning, in: M. Sovilj, P. Marković, S. Jovičić, A. Kostić, and D. Raković, eds.; *Speech and Language*; IEFPG, Belgrade, 2003.
- [27] Pribram, K. H.; *Languages of the Brain*; Brooks/Cole, Monterey, CA, 1977, 2nd ed.
- [28] Petersen, I., Sellden, U., and Eeg-Olofsson, O.; The evolution of the EEG in normal children and adolescents from 1 to 21 years, in A. Remond, ed.; *Handbook of EEG and Clinical Neurophysiology*; Vol. 7, Part B: *Influence on the EEG of Certain Physiological States and Other Parameter*; Elsevier, Amsterdam, 1974.