

QUANTUM-HOLOGRAPHIC AND CLASSICAL HOPFIELD-LIKE ASSOCIATIVE NNETS: IMPLICATIONS FOR MODELING TWO COGNITIVE MODES OF CONSCIOUSNESS

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Abstract. In this paper quantum bases of consciousness are considered with psychosomatic implications of three front lines of psychosomatic medicine (hesychastic spirituality, holistic Eastern medicine, and symptomatic Western medicine), as well as cognitive implications of two modes of individual consciousness (quantum-coherent transitional and altered states, and classically-reduced normal states) alongside with conditions of transformations of one mode into another (considering consciousness quantum-coherence/classical-decoherence acupuncture system/nervous system interaction, direct and reverse, with and without threshold limits, respectively) - by using theoretical methods 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 organised and interconnected neural networks* [1-3]. Alongside with the development of experimental techniques enabling physiological investigation of interactions of hierarchically interconnected neighbouring levels of biological neural networks, significant contribution in establishing the neural network paradigm was given by theoretical breakthroughs in this field during the past two decades [2]. 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 Schrodinger equation *analogous* mathematical formalism as the Hopfield *quantum-holographic associative neural network* [3].

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 [6-9], and other holistic manifestations of consciousness, like transitional states [9] and altered states of consciousness [10], conscious/unconscious transitions and consciousness pervading body [11] - 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) [12,13] (highly resonant microwave (MW) sensory response of the disordered organism, biologically efficient nonthermal MW radiation of the extremely low intensity, and neglecting MW energy losses alongside acupuncture meridians), the *acupuncture system* is the only *macroscopic quantum system* in our body (while brain still seems not to be [14]). And as recent investigations show that any quantum system has formal mathematical structure of *quantum-holographic associative neural network* [3] - then (according to Tibetan traditional medicine acupuncture-meridian temporary-reprogrammable [15]) *memory attractors of the acupuncture network* can be treated as *psychosomatic disorders* representing EM/MW (*quantum*) *holistic records* (cf. Fig. 1), which might be therefore removed only holistically, supported by an extreme efficiency of the MRT therapy that consequently erases the very information of the psychosomatic disorders -

which represents biophysical basis of *(quantum)holistic local psychosomatics* [9,16,17]!

More concretely, during application of *MRT therapy* for transferring *acupuncture system* S_k from the psychosomatically disordered initial *stationary*

classically-reduced state $\widehat{\rho}_{S_k}^k = \sum_i |c_{k_i}|^2 |\phi^{k_i}\rangle_{S_k} \langle \phi^{k_i}|$, it is necessary during the

nonstationary strong external action (T_{ext}) to provide external microwave energy for skipping over potential barrier of the disordered state ($\Delta E_{S_k}^{k_2,0}$)

giving rise to *nonstationary quantum-coherent superposition* $|\phi^{k'}\rangle_{S_k} =$

$\sum_i c'_{k_i} |\phi^{k_i}\rangle_{S_k}$, which after *nonstationary* relaxation process (T_{rel}) of taking-

off the excess external energy ($\Delta E_{S_k}^{k_0,2}$) giving rise to another *nonstationary*

quantum-coherent superposition $|\phi^{k''}\rangle_{S_k} = \sum_i c''_{k_i} |\phi^{k_i}\rangle_{S_k}$, gives rise to

decoherence and to the final *stationary classically-reduced state*

$\widehat{\rho}_{S_k}^{k'''} = \sum_i |c'''_{k_i}|^2 |\phi^{k_i}\rangle_{S_k} \langle \phi^{k_i}|$ - with net completed decoherent single-quantum

state-change of the classically-reduced acupuncture system $\widehat{\rho}_{S_k}^k \rightarrow \widehat{\rho}_{S_k}^{k'''}$ (with

$|c'''_{k_i}|^2 \neq |c_{k_i}|^2$, differing finally in annihilated one quantum of microwave energy in the state $|\phi^{k_2}\rangle_{S_k}$ and created one quantum of microwave energy in the state $|\phi^{k_0}\rangle_{S_k}$)!

By multiple repeating of this process, the depth of the

memory attractor k_2 is getting shallower while the depth of the memory

attractor k_0 is getting deeper, finally giving rise to complete erasing of the

psychosomatic disorder $|\phi^{k_2}\rangle_{S_k}$ and deepening of the healthy state $|\phi^{k_0}\rangle_{S_k}$,

i.e. *dynamic modification of the potential hypersurface of the acupuncture*

macroscopic quantum system, in full analogy with the situation of learning

classical Hopfield associative neural networks in their energy-configuration

spaces, and Hebbian modification of the minima depths of the energy

hypersurface, being the attractors of neural networks memory patterns

$|\phi^{k_0}\rangle_{S_k}, |\phi^{k_1}\rangle_{S_k}, |\phi^{k_2}\rangle_{S_k}$.

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 psycho-

somatic disorders [18]), whose simultaneous effects of *visualisation and*

tapping/touching acupuncture points might be interpreted as a "*smearing*"

of memory attractors of the psychosomatic disorders, through successive

imposing new boundary conditions in the acupuncture energy-state space during visualizations of the psychosomatic problems [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* [9,17] with various microquantum and macroquantum (both nonbiological and biological) excitations, which is widely spread thesis of *Eastern esoteric/religious traditions* [19] - 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 [20]) - which might represent biophysical basis of (*quantum*)*holistic global psychosomatics* [9,17]!

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 [21]. 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 [22] - including quantum-holographic coupling of the acupuncture and genetic levels, with mutual *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" [23]. Then emphasis on *three front lines of psychosomatic medicine* might also be pointed out [17]: *hesychastic spirituality*, with prayer-mediated final erasing of quantum memory attractors on the level of collective consciousness; *holistic Eastern medicine*, with acupuncture/psychotherapy-mediated temporary erasing of quantum memory attractors on the level of individual consciousness; and *symptomatic Western medicine*, with immunology/pharmacology/surgery-mediated alleviation of the somatized consequences of the carelessness on the first two front lines - with stressing *religious/social implications* that *necessary* activities on the second and third front lines, with *neglect* of the first one, have a consequence of *further transfer* of quantum memory attractors on the level of individual and collective consciousness in this and coming generations, thus *accumulating* quantum-holographic loads which afterwards cause not only illnesses, but also interpersonal fights, wars, and other troubles; this also implies necessity of *re-consideration* of educational/informational/political goals of our civilization, with re-

orientation towards holistic *gentle actions for global solutions of the “world risk society”* [24].

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

2. QUANTUM AND CLASSICAL NEURAL NETWORKS FOR MODELING TWO MODES OF CONSCIOUSNESS: COGNITIVE IMPLICATIONS

Accordingly, we may speak of *two cognitive modes* of individual consciousness [9,17]: 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 [3] combined with quantum decoherence theory [25] might be applied.

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 tunnelled quantum-holographic Hopfield-like electromagnetic/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 [9,17,26] - 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 [1], thus *classically-reducing* initially obtained direct quantum-coherent information content - so explaining *generally poor* informational rationalisation 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* perceptually/rationally mediated *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" [9]).

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 the 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 $\hat{\rho}_{S_k}^k =$

$\sum_i |c_{k_i}|^2 |\phi^{k_i}\rangle_{S_k S_k} \langle \phi^{k_i}|$, with probabilities $|c_{k_i}|^2$ of the realisation 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 [3,17], while the time evolution $\hat{\rho}_{S_k}^k(t)$ of the

classically-reduced stochastic state of k -th individual consciousness might be described by *classical* Hopfield-like neural network [2,17], represented by changes in the shape of the potential hypersurface in the acupuncture

energy-state space $(E_{S_k}, |\phi^k\rangle_{S_k})$, cf. Fig. 1), achieved by exciting consciousness/acupuncture system S_k from initial *stationary classically-reduced state*

$\hat{\rho}_{S_k}^k = \sum_i |c_{k_i}|^2 |\phi^{k_i}\rangle_{S_k S_k} \langle \phi^{k_i}|$ via intermediate *nonstationary quantum-coherent (excitation) superposition*

$|\phi^{k'}\rangle_{S_k} = \sum_i c'_{k_i} |\phi^{k_i}\rangle_{S_k}$ and

(relaxation) *superposition* $|\phi^{k''}\rangle_{S_k} = \sum_i c''_{k_i} |\phi^{k_i}\rangle_{S_k}$ into subsequent final

stationary classically-reduced state $\hat{\rho}_{S_k}^{k''} = \sum_i |c''_{k_i}|^2 |\phi^{k_i}\rangle_{S_k S_k} \langle \phi^{k_i}|$, with $|c''_{k_i}|^2 \neq$

$|c_{k_i}|^2$ (cf. Ch. 1 and refs. [25]).

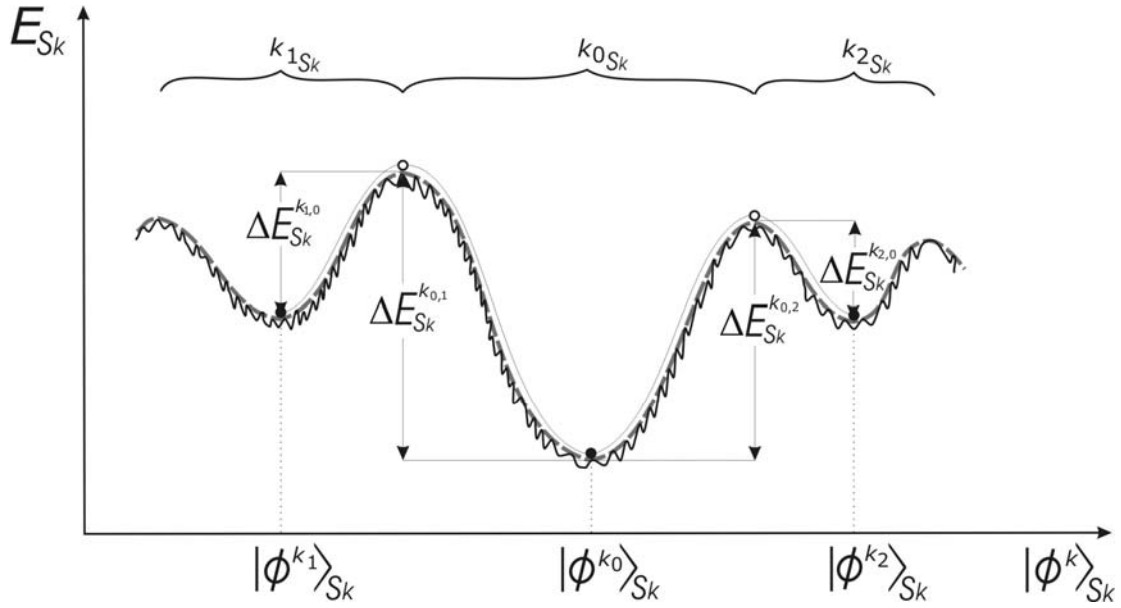


Figure 1. Schematic presentation of the memory attractors of microwave (MW/dashed line) ultralowfrequency (ULF/full line) modulated EM/ionic quantum-holographic acupuncture system/consciousness of the k -th organism in the energy-eigenstate space $(E_{S_k}, |\phi^k\rangle_{S_k})$ of the system S_k : k_{0S_k} - basin of attraction of the ground (healthy) MW state $|\phi^{k_0}\rangle_{S_k}$; k_{1S_k} and k_{2S_k} - basins of attractions of the two psychosomatically disordered MW states $|\phi^{k_1}\rangle_{S_k}$ and $|\phi^{k_2}\rangle_{S_k}$ (hundreds of them being in general), modulated by numerous low-amplitude ULF states of the brain hierarchical neural networks.

These cognitive modes of individual consciousness are presumably interchanged by periodicity of ~ 2 -hour *ultradian rhythm*, both in waking and sleep states [27], which according to quantum-relativistic/quantum-holographic model of consciousness [9] 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 tunnelling of individual consciousness in highly noninertial transitional states of consciousness (without space-time barriers, closely related to nonlocal role of (generalised field-related collective) consciousness in the *wave function quantum collapse* [9,17]). But, 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 part of individual consciousness from nonstationary quantum-coherent state of the quantum-holographic Hopfield-like neural network in the 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 part of individual consciousness in quantum-gravitationally mentally-channelled tunnelling of the displaced part of individual consciousness upon its body, this information is further transcribed through (MW/ULF) EM interaction acupuncture system/nervous system and afterwards language/artistic/scientific filtered by the brain hierarchical neural ERTAS system (with accompanied brainwave "frequency uprising" thought from lower-frequency ULF (δ, θ) unconscious form of subliminal thought to higher-frequency ULF (α, β, γ) conscious form, with significant unconscious-contextual cognitive/linguistic and psychotherapeutic implications [28]). 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 [9,16,23], which makes bodily acupuncture system an extremely sensitive quantum sensor) and therefore filters all thus extrasensory obtained information below nervous threshold potential, preventing them 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 coloured" i.e. has sufficient critical depth of MW/ULF EM acupuncture memory attractors (cf. Fig. 1), or has greater general acupuncture energetic potential (inborn or gained through various traditional techniques of stimulation, deep breathing, relaxation, meditation or prayer).

On the contrary, 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 - 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 [16] - 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 afterwards collapses into next stationary classically-reduced state. This can be also a model of (most frequently) perceptually/rationally induced strong intentional classical/quantum/classical stationary/nonstationary/stationary backward hierarchical (inter) actions nervous/acupuncture/nervous systems - i.e. model of *free will*.

4. CONCLUSION

In this paper, *quantum bases of consciousness* are considered with psychosomatic implications of *three front lines of psychosomatic medicine* (*hesychastic spirituality*, with prayer-mediated final erasing of quantum memory attractors on the level of collective consciousness; *holistic Eastern medicine*, with acupuncture/psychotherapy-mediated temporary erasing of quantum memory attractors on the level of individual consciousness; and *symptomatic Western medicine*, with immunology/pharmacology/surgery alleviation of the somatized consequences of the carelessness on the first two front lines) - as well as cognitive implications of *two modes of individual consciousness* (*quantum-coherent* and *classically-reduced*), alongside with conditions of transformations of one mode into another - 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 *generally poorer* in information than full quantum-holographic awareness of spiritual/religious mystical experiences).

However, the above-mentioned division in two cognitive modes of individual consciousness is still non-quite sharp, and *conditions of transformations* of one mode into another as well as the model of *free will* might be provided on this line, by considering consciousness *quantum coherence/classical decoherence* acupuncture system/nervous system interaction (direct and reverse, with and without threshold limits, respectively).

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