# Quantum Modeling of Telepathy

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## Abstract

The proposed model try to fit the phenomenon of telepathy into a physical theory based on the quantum effects in the brain established experimentally in literature. The authors show that the phenomena of quantum coherence and entanglement are involved in the cognitive-psichophysiological activity of the brain, and they assume these phenomena to have a decisive role in understanding of the telepathy, unexplained process until now satisfactory. The coherence of the psichons emitted by different subsystems of $N$ neurons as well as the excitation of various subsystems of neurons by other coherent neuron subsystems determine superradiant coherent states of such subsystems. We refer to the brains M and S which are in entanglement as a result of a primary cells division, named below M-cell and S-cell, the gennes being the carriers of elementary genetic information between the resulting components of the division process.

The authors assume the existance of a equilibrium between the superadiante entanglement states of different subsystems of neurons of the M and S brains, the distance between the persons M and S being undefinite large. It is possible that a factor H, to disrupt the equilibrium state between the brains M and S being in entanglement as a result of a other superradiante process, for example, and to switch the entanglement between S and M. The brain M no longer being in entangled equilibrium with S, emits superradiantly a locally psichon.

This psichon locally emited superradiantly is felt resonantly by other subsystems of neurons and disrupt the activity of the M brain, which feels by telepathy, on this way the perturbation of the S brain by the factor H. By assuming the decisive role of these phenomena in understanding of the telepathic process the model is original and based on realistic assumptions.

*Keywords*: psichology, brain, superradiant state of neurons, psichons, entanglement, neurobits, telepathic communications

## 1. Introduction

Psychophysiological mental activity is governed by laws in which we need to consider the quantum effects of coherence and entanglement at the neuron level of the brain, as being suitable phenomena to explain the experimental observations concerning the information processing at that level. We refer, for example, to telepathic communications and also, at the selforganizing orientation of the social groups of persons as a reflection of the neuron structure and activity, in spite of the natural evolution of the systems according to general principle of thermodynamics [1-7].Telepathy is describes by Parapsychology as the transfer of thoughts and feelings between two or more subjects through Psi extrasensory perception (ESP) without physical barriers as those of distance or time.

The studies show that telepathy have not yet repeatable results, not is well controlled, and the phenomenon is not yet completely understood. A correlated another problem is that of the consciousness which seems to emerge as an important property of the complex activity of the brain which wait to be understand. It seems that the consciousness implicates as well as telepathy and the quantum coherent states of the brain.

The electromagnetic waves of extremely low-frequency (ELF) as telepathic information transmission mechanism were proposed in 1974 by Michael Persinger but Johnjoe McFadden has written "the electromagnetic field outside the head is far too weak and it is highly unlikely that any other brain could detect it, and still more unlikely that the other brains could decode the electromagnetic field information that was encoded by the brain".

Later, Gerald Feinberg suggested as telepathic carrier an undiscovered elementary particles which he called "mindon". The parapsychologist Charles Tart, in recent years, in spite of accepting the existence of telepathy, decided that telepathy is nonphysical in nature and can not be fitted into a physical theory. Another researcher Hans Berger, established that telepathy occurs when "electrical energy in the agent's brain is transformed into psychic energy which can be diffused to any distance, by passing through obstacles without attenuation".The physical nature of telepathy has been basically confirmed by experiments: Duane and Behrendt, 1965, Targ and Puthoff 1974, Puthoff and Targ 1976, Bierman and Radin 1997, Wackermann et al, 2003.For strictly confirmation of the telepathy, many experiments are in progress. With the advent of powerful new tools like lasers of femtoseconds and positioning with the nanoscale precision, "life's quantum dance is finally coming into view" said Christopher Altman, a researcher at the Kavli Institute of Nanoscience in the Netherlands. It is tempting for us to try to explain brain function using quantum mechanisms. Along with brain oscillations and neural connections, finding quantum effects in the brain could integrate information regardless of its nature: physical, digital, biological or mental. Also, the approach of explanation of the consciousness seems to implicate both the quantum coherence and as well the entanglement [8-12]

## 2. The quantum effects in the brain. The coherent states and the entanglement

Different studies have shown the coherence, the tunneling effect and the entanglement as essential phenomena in the activity of the neurons.

The neurons or nerve cells are the basic components of the nervous system that includes the brain, spinal cord, and peripheral ganglia.

The neurons are connect together to form neural networks. Each of the $10^{11}$ neurons has on average 7000 synaptic connections to other neurons.

The neurons cells have to process and transmits information by electrical and chemical signals. A chemical signal occurs in a synapse, a specialized connection with other cells. The neuronal signaling consists in the transfer of information from the external environment, through neurons, and back again to the external environment.

THe neurons are cells excitable electrically which processes and transmits information by electrical and chemical signals occuring in the synapses, specialized connections with other cells.

Transmission of nerve impulses is a response of the type " all or nothing". A stimulus with higher intensity does not produce a stronger signal but can produce a higher frequency of " sparking " ( firing, signaling). The intensity of the stimulus increases firing frequency, ie the number of nerve impulses per second depending on the strength of the stimulus, a kind of conversion intensity-frequency . This is similarly, with the photonic nature of light where, a higher intensity is obtained with more photons, not with a more stronger photon for a specific frequency [13-17]. The relationship between the stimulus and neuronal responses of the individual or of the ensemble is characterized by neural coding. Both digital and analog information can be encoded by neurons.

## 2.1. The quantum coherent states

The neurons from different parts of the brain oscillate together.

This is demonstrated by communication between two different brain regions in the memory case.

It is shown that at the output, the pulse frequency of a neuron will generate an action potentials, that oscillate at frequencies from 1 –100 Hz, producing characteristic waves resulting from synaptic interactions of millions of neurons which share a spatially coherent oscillation of them. These waves act as carriers, amplitude modulated by spatial patterns having distinctive configurations corresponding to the sensory stimuli in order to to be discriminate by the subject [18-24].

One can consider two types of coherence in the brain:

One type of coherence involve neurons oscillating at a particular frequency, so being the case of microtubules and "phase lock" manifestations.

The second type of coherence involve other neurons which show coherence patterns at different amplitudes and frequencies, as in the case of the patterns of thought or attention. In this case the brain of the subject may do many activities simultaneously.

Based on the analogy between a two-level atomic system with a system of neurons postulated by this model, we can extend the theory of superradiance and photon echo to the neuronic systems [2].

Thus, if all $N$ neurons are initially excited, we obtain the expression for the signaling rate:

$$I\left(N/2, N/2\right) = NI_0 \tag{1}$$

where $I_0$ is the signalig rate of a single neuron. So all neurons are signaling independently without interference effects to occur. In conditions where the maximum signaling rate is obtained:

$$I(N/2, 0) = \frac{N}{2}\left(\frac{N}{2} + 1\right)I_0 \cong \frac{N^2}{4}I_0 \tag{2}$$

Such a neuronic system states for which the rate of signaling is proportional to $N^2$ are called superradinte states and correspond to in phase oscillation of all neurons excited.

Two physicists at Starlab, Pierre St. Hillaire and Dick Bierman had proposed an experiment to utilize the photonic echo to put into evidence the quantum coherent superposition of the states in the human retina, as a part of a brain, using short laser pulses of very low power.

Current models accept that the tubulin within microtubules can exist in a quantum superposition of two or more conformational states and undergo coherent excitation, will switch between these states in nanoseconds.

A functional connectivity between the signaling output of various neurons are statistical established. This kind of manifestations of neurons signaling determine a coherent response to stimuli as a consequence of their organizing in clasters, another manifestation of a neuronic coherence.

Milner–von der Malsburg had formulated the hypothesis of the establishing strong correlations ("phase locking") among a small subset of neurons having high pulse rates in a given time window, according to stimulus types, as a manifestation of a self–organization mechanism to coherence.

Other studies reveals a synchronization of theta wave frequencies between two different regions of the brain, for example, a visual center and a prefrontal memory region, in order to explain the visual memory, showing that differnt regions of the brain are in a integrated contact and how the quantum concepts affect the brain mechanis.

## 2.2. The quantum entanglement

The evidence of quantum effect of entanglement in brain was shown for the basic helical structure of DNA which is stabilized by quantum entanglement.

The Qubit neuron is already accepted by the scientific world. By definition, quantum neuron is inactive in state 0 and lights (sparkles) in state 1 [8-10].

An arbitrary state is described by a superposition of states according to the equation:

$$\left|\Psi\right\rangle \equiv \alpha\left|0\right\rangle + \beta\left|1\right\rangle \tag{3}$$

using the base states, denoted by $|0>$ and $|1>$. The Qubit neuron is a linear superposition of these two states, where the amplitudes of probabilities $\alpha$ and $\beta$ are generally complex numbers and:

$$\left|\alpha\right|^2 + \left|\beta\right|^2 = 1 \tag{4}$$

A **Neurobit** is a unit of neural information and represents the quantity of information that can be stored in the simplest state of a neuron, for example, in a excitated state of a neuron of the brain as a quantum system.

## 3. The proposed quantum model of telepathy

Norbert Wiener appreciated that "a phenomenon will be a real object of scientific research when they find physical correlations, which actually should be". It is now time to emphasize such correlations for the telepathy? The proposed quantum model of telepathy try to establish this kind of correlations for the quantum information processing in the human brain taking into considerations that telepathy does not have yet a physical theory satisfactory. The model generalize the quantum theories of the coherence and entanglement for the human brain activity, based on the discovered quantum effects in the brain activities presented above.

**1**.The proposed model below was suggested by the behavior of the neurons in the brain like a bistable device, by analogy with the two-level atomic system [2].

The coherence between neurons is explained based on this model, possible to be generalised for every subsystem consisting by *N* neurons by defining the concept of "neuronic coherence" and "superradiant state of neurons" emitting "coherent psichons", that are "mental informational waves" [14 ]. The coherence of the psichons emitted by differnt subsystems of *N* neurons as well as the entanglement of the neuronic subsystems, belonging to the brains of different persons, having origin in the primary cells division, named below M-cell and S-cell, the gennes being the carriers of elementary genetic information between the resulting components of the division process.

These phenomena are fundamental in the telepathic communication between two persons. The telepathic communication is very easy to be understand according to this model, by state modification of the subsystems of neurons belonging to the brain of a M type person being in a "superradiant state of neurons" situated in some place, in which generate locally a psichon. We have to stress that this "superradiant state of neurons" was imposed by a twin "superradiant state of neurons" in the brain of a S type person situated at an indefinite distance, as a consequences of the law of conservation of the entanglement applied to them. The emitted psichons being identical for the two superradiant processes of emission are necessary entangled each other.

These psihons reprezent locally signals which are felt as a perturbaion by the receiving persons. The result can be experimentally verified by using a classical canal of communications between the implied persons. The obtaining of the "superradiant state of neurons" for a person is possible as in the case of the superradiant state of atoms in special conditions. These imply or a command through a strong psichophysiological mental signal, or internally by a command of a chemical or electrical nature. This action, produced for example, by strong emotions or by an internal or external volutive actions or by similar means using "rezonant psihons" as in the case of exciting the atomic superradiant states, can be described by a 2-component vector named psihoforce $\Psi(c, e)$. The two components, c-chemical and e-electrical of the $\Psi(c, e)$ are liniarly independent.

This telepatic system of communications is a duplex one in accord with the adopted names M and S, for the transmission and receiving points[2, 23]. The mathematical model proposed in the paper is based on the hypothesis of the coherent superpozition of the two states of neurons in the subsystem[2], unlike the independance of these states, determining an pseudo neurospin vector, having a precesion motion around the commnd psychophysiological mental signal, the psihoforce $\bar{\Psi}$ *(c, e.)*

**2.** Cosequently, the coherence between the neurons can be induced by many ways: by external stimulus resonantly (hypnosis), can be selfinduced or can appears as a consequence of a external superradiant pulse. The excitation of various subsystems of neurons in the superradiant coherent states, for one person in suitable conditions determines the emission of a strong coherent pulse characteristic to the multiple superradiance phenomenon. Being received by the same person or by other persons, that pulse disrupt the neural activity of the receiver and manifests itself as a perturbation of large spectrum as being the result of many different stimulus. Anyway the person is constient that something was happened.

**3.** But, in this stage, we have explained the manifestation of the telepathic transmission of information at very long distances, instantaneusly, without telepathic waves, which are not yet detected and characterised experimentaly as being electromagnetic waves or an another with such kind of behaviour.The authors have completed their model with the entanglement of the neurons subsystem being in the superradiant coherent state of the M brain with the neurons from the subsystems belonging to the brain of the S type person, situated at an indefinite distance from M person, that means by using nonlocal correlations between the M brain and S type brains, which can be controlled in some conditions eperimental. It means that a similar superradiant coherent states is born in the subsystems of neurons, belonging to the brain of S type person instantaneusly. The bringing of the neurons of the person M, in a superadiant state can be assimilated with a measurement process which modifies the "polarization" and "phase" of the oscillating neurons in the considered subsystem. But this process is felt by neurons from the subsystems belonging to the brain of S type person which selforganise in the superradiant coherent state simultaneously, being forced by the low of conservation of the entanglement, concerning the polarization of the oscillating neurons [20-23]. Similarly, the superradiant signaling of the subsystem of neurons of M person in spite of the fact that is apparently acausal, is equivalent therefore with another measurement process which modify correspondingly the state of the entangled subsystem of the S person.( Indeed, from the model of the photonic echo it is well known the phenomenon of temporarily relative dephasing of the oscillating neurons which were in the superradiant coherent state, after the emission of the pulse characteristic to the superradiance phenomenon.[2, 16])

## 4. Conclusions

The model try to fit the phenomenon of telepathy into a physical theory based on the quantum effects in the brain established eperimentally, as can be seen in the indicated references.The model is based on the phenomena of quantum coherence of the

systems of neurons, and on their superadiant states and entanglement, that are generally involved in the activity of the brain. By assuming the decisive role of these phenomena in understanding of the telepathic process the model is original and based on realistic assumptions but the definitive confirmation will be given be future experiments.

## 5. Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this article.

## References

[1] Kandel E.R., Schwartz, J.H., Jessell, T.M. 2000. *Principles of Neural Science*, 4th ed., McGraw-Hill, New York.

[2] Paul E. Sterian, *PHOTONICS* ( In Romanian) Printech Publishing House, Bucharest, 580 p., (ISBN 973-652-161-3, ), 2000.

[3] Bullock, T.H., Bennett, M.V.L., Johnston, D., Josephson, R., Marder, E., Fields R.D. 2005. *The Neuron Doctrine, Redux*, Science, V.310, p. 791–793.

[4] Peters, A., Palay, S.L., Webster, H, D., 1991 *The Fine Structure of the Nervous System*, 3rd ed., Oxford, New York.

[5] R.W Shoenlein, L.A. Peteanu, R.A. Mathies, C.V. Shank, "The first Step in Vision: Femtosecond Isomerization of Rhodopsin", Science, Volume 254, October 18, 1991, p 412-415.

[6] L. Mandel and E. Wolf, "Optical Coherence and Quantum Optics", Cambridge University Press, pp. 809-813 (1995).

[7] T. Wang, C. Greiner, J. R. Bochinski, and T. W. Mossberg, "Experimental study of photon-echo size in optically thick media", Phys. Rev. A 60, R757 (1999)

[8] A. Einstein, B. Podolsky, and N. Rosen: *Can quantum-mechanical description of physical reality be considered complete?* Physical review 47, 777 (1935).

[9] Bell, J.S.: *On the Einstein-Poldolsky-Rosen paradox*. Physics 1, pp. 195-200 (1965)

[10] C. H. Bennett, G. Brassard, C. Cre'peau, R. Jozsa, A. Peres, and W. K. Wootters: Phys. Rev. Lett. **70** (1993) 1895[APS].

[11] D. Bouwmeester, J. Pan, K. Mattle, M. Eibl, H. Weinfurter, and A. Zeilinger: Nature **390** (1997) 575[CrossRef];

[12] D. Boschi, S. Branca, F. De Martini, L. Hardy, and S. Popescu: Phys. Rev. Lett. **80** (1998) 1121[APS];

[13] M. A. Nielsen and I. L. Chuang: *Quantum Computation andQuantumInformation* (Cambridge University Press, 2000) Sect. 8.

[14] D. A. Iordache, et al., "Complex Computer Simulations, Numerical Artifacts, and Numerical Phenomena", *International Journal of Computers, Communications & Control*, Volume: 5, Issue: 5, pp. 744-754, 2010.

[15]　O.Tesileanu,　D.M. Filipescu, Gh. Cata-Danil and N. V. Zamfir, "Nuclear photonics at ELI-NP, *Romanian Reports in Physics*, Vol. 64, Supplement, pp.1373-1379, 2012.

[16]　A. R. Sterian, et al., "Modulated laser diode for medical applications", *Proc. of SPIE,* Volume: 5581 Pages: 274-279 DOI: 10.1117/12.582837, 2004.

[17]　D. A. Anghel, et al., "Modeling Quantum Well Lasers" , *Mathematical Problems in Engineering*, Article Number: 736529 DOI: 10.1155/2012/736529, 2012.

[18]　A. R. Sterian. "Coherent Radiation Generation and Amplification in Erbium Doped Systems", "*Advances in Optical Amplifiers"*, Paul Urquhart (Ed.), ISBN: 978-953-307-186-2, InTech, Vienna, 2011.

[19]　A.R. Sterian and P. Sterian, "Mathematical Models of Dissipative Systems in Quantum Engineering"*, Mathematical Problems in Engineering,* vol. 2012, Article ID 347674, 12 pages, doi:10.1155/2012/347674, 2012.

[20]　O. Danila, P. Sterian, et al., "Perspectives on entangled nuclear particle pairs generation and manipulation in quantum communication and cryptography systems", *Advances in High Energy Physics*, Article Number: 801982, 2012.

[21]　A. R. Sterian, " The Structure of an Automatic Decision System for a Large Number of Independent Particle Detectors", *Advances in High Energy Physics,* Article Number: 839570 DOI: 10.1155/2013/839570, 2013.

[22]　O. Danila, M. Demicheli, P. Aschieri, P. Sterian, "Theoretical studies and simulation of graded index segmented LiNbO3 waveguides for quantum communications", *Optoelectronics and Advanced Materials – Rapid Communications*, Vol. 6, No. 1-2, January-February pp. 40 - 43, (2012).

[23]　B. A. Stefanescu, D. Anghel, O. Danila, P.Sterian et al*.,* "Applications of quantum cryptology for data transmissions implemented in a student laboratory", *Annals of the Academy of Romanian Scientists Series on Science and Technology of Information,* ISSN 2066-8562, vol. 5, N. 1 (2012).

[24]　M. Dima, M. Dulea, D. Aranghel, P.Sterian et al*.,* "Classical and quantum communications in grid computing", *Optoelectronics and Advanced Materials-Rapid Communications,* Vol. 4, No. 11, pp.1840-1843, (2010).

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