

TOWARDS ONTOLOGY FOR A UNIFIED KNOWLEDGE: THE HYPOTHESIS OF LOGICAL QUANTA

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Abstract

The Hypothesis of Logical Quanta (HLQ) is a bidirectional synthesis of the medieval theory of logos of beings and the philosophical interpretation of quantum mechanics. The result of such a synthesis is enrichment to the ontology of physics that enable us to have a unified view and an explanatory frame of the whole cosmos. It also enables us to overcome the Cartesian duality both on biology and the interaction of body and mind. Finally, one can reconstruct a new understanding of spiritual life and religion.

The weirdness of quantum mechanics

From the very beginning of quantum mechanics it was obvious that there was something absurd about it. A hundred years later, we are still speaking about quantum paradoxes.¹ There is a difference albeit; we now know that these paradoxes govern the way things *are* at the most fundamental level. The quantum paradox can be described with one phrase; Things in quantum world behave in a strongly different way than in our everyday world.² There is a loophole in our understanding of the (real) nature of the physical world.

This is not the only one. There are also loopholes in our understanding of the nature of life and, even more, the nature of consciousness. There is also more weirdness about the special abilities of the inner world of human beings. Confronting this situation, we usually avoid the problem by dividing it in no compatible sections and dismissing all evidence not fitting to our bias³ This vein of thinking helped a lot in

solving many scientific problems of everyday world,⁴ but there are strong indications that it ends at a deadlock.

Working on the opposite direction, there is a hard temptation to follow a confusing way of thinking, like this; quantum mechanics is weird, spiritual life is also unusual, so these are similar in this respect, or it is possible to interpret the second through the first.⁵ This paper presents a synthesis of quantum mechanics and the ontology based on the notion of logos, as this has been developed in ancient and Medieval Greek philosophy and theology. We acknowledge the danger just mentioned and we try to overcome it, by clarifying as possible the way we work.

On the other hand, philosophy of logos has been developed in a theological context, and theology, nowadays, is strongly ideological. An ontological proposal for unifying the knowledge, the spiritual and the scientific one, has to be accepted both by believers and non believers. This restriction demands a special interpretation of theology. In fact, there is a conceptual tool useful for both cases. This is the distinction that should be made, between empirical data connected with physical or spiritual facts, their explanation and, finally, the ontology that one can construct by using them, in other words, the metaphysics that one could attach to these data.

Empirical data, explanation and ontology.

In physics we usually attach a set of empirical data to a theory that explains them. Such a theory is a conceptual construction explaining the causes of these data and predicts their evolution in time and /or space. The data are correlated with entities and, usually, when we know the data and the theory we think that we know the entities and the ontological state of these entities. In our everyday life, the theory that predicts the evolution of the entities and the theory, i.e. the ontology that describe their ontological state, coincide.

In Philosophy of Science, it is well known that the adoption of the right theory that describes the evolution of an entity, or a phenomenon, is very complicated. However, the distinction between the theory and the description of the ontological state is less obvious, and in our everyday life it is expelled. The interconnection of the facts and the theory that explains them is well studied by the philosophy of science and we know well that a data set can be explained by more than one theory, and we can find related examples in many scientific fields.⁶ In certain scientific fields, we have different theories, which describe the same ontological states of an entity. A scientific theory is expressed by a mathematical formalism.⁷ In our everyday world physics, i.e. the classical physics, the entities that formalism describes are well defined. There is a rigid connection between data, formalism and entity. This is not the case in quantum physics, as we will clarify afterwards.

The same distinction is very useful, when we work at interpreting theology. Theology starts by determining the ontological status of the entities, and then develops a theological theory about them and connects them with empirical data. Traditional theologies work like classical physics. The interconnections between the three stages are very rigid. I have in mind traditional monotheistic theologies. In our globalized world, this attitude of monotheistic mainstream theologies has been proved insufficient. The problem is that the same or very similar data, like religious and

mystical experiences or miracles, are explained by different theologies in various ways, all of them claiming the same credibility with reference to the same ontological state of a fundamental conceptual entity, named God. This situation is probably hard for traditional theologies, but allows us a very fertile approach to any theological system. We can accept the truthfulness even the objectiveness, of spiritual or mystical empirical data and can distinguish them from any subjective theological system and the almost arbitrary ontology that this system produces. It is possible to accept certain parts of a theological system and introduce them to our interpretation of physical phenomena. The result could be a synthesis of an old tradition with contemporary philosophical or scientific research. Through this procedure, there could be a great gain. A unification of our understanding of spiritual and physical world.

Interpreting Quantum Mechanics

It is quite important to clarify the conceptual framework of the interpretative problem of quantum mechanics. It is about the behavior of a quantum entity, being in a very special condition, in a superposition state.⁸ Such a quantum entity is a microscopic particle that we study per se, when it is not correlated with macroscopic environment. This happens, generally talking, when such an entity exists between two successive measurements.⁹ Quantum weirdness appears, when such an entity interacts with macroscopic environment at the end of the second measurement.

“Quantum mechanics is, at least at first glance and at least in part, a mathematical machine for predicting the behaviors of microscopic particles — or, at least, of the measuring instruments we use to explore those behaviors — and in that capacity, it is spectacularly successful: in terms of power and precision, head and shoulders above any theory we have ever had. Mathematically, the theory is well understood; we know what its parts are, how they are put together, and why, in the mechanical sense (i.e., in a sense that can be answered by describing the internal grinding of gear against gear), the whole thing performs the way it does, how the information that gets fed in at one end is converted into what comes out the other. The question of *what kind* of a world it describes, however, is controversial; there is very little agreement, among physicists and among philosophers, about what the world *is like* according to quantum mechanics. Minimally interpreted, the theory describes a set of facts about the way the microscopic world impinges on the macroscopic one, how it affects our measuring instruments, described in everyday language or the language of classical mechanics. *Disagreement centers on the question of what a microscopic world, which affects our apparatuses in the prescribed manner, is, or even could be, like intrinsically; or how those apparatuses could themselves be built out of microscopic parts of the sort the theory describes.*”¹⁰

In common English, a quantum entity appears to be either a particle, or a strange kind of wave. It appears with a different “personality”, which is supposed to be depended on the structure of the measurement apparatus we use.¹¹ It responds instantly to any change we make to apparatus, sometimes even before we make our decision, as if it knows what we (will) have in our mind.¹² Somehow, it changes its condition and it is transformed into to a regular particle. This transformation obeys to strictly defined rules that are statistical. When such a transformation occurs, we, by no means, know what exactly will happen. A quantum entity appears to communicate instantly with the whole universe.¹³ After all, there is the famous Uncertainty Principle of

Heisenberg: "According to quantum mechanics, the more precisely the position (momentum) of a particle is given, the less precisely can one say what its momentum (position) is. This is (a simplistic and preliminary formulation of) the quantum mechanical uncertainty principle for position and momentum."¹⁴ It is obvious that no entity of our world can have such a behavior.

Using the distinction we have made, when we study a quantum phenomenon, we have a well defined set of empirical data, a set of explanations for them, but we have no ontology, that could be well accepted by physics and philosophers, describing what a quantum entity *is*. We have a behavior that is well observed, well explained and calculated by mathematical formalism of quantum mechanics, but we cannot adapt the nature of a quantum entity with any entity of our everyday world. There are various interpretations of quantum mechanics aiming to reconcile our observations of quantum world and our observation of our everyday world¹⁵

From our point of view, these interpretations follow two main ways. The first is to avoid, somehow, the ontological problem and focus on the explanatory part of quantum theory. These are based on what we call Copenhagen's interpretation. There are various alternatives but, in fact, it is still impossible to avoid ontology. They introduce a number of principles aiming to explain the experimental data. The most famous among them is the Complementarity Principle, proposed by Niels Bohr,¹⁶ or the Projection Postulate proposed by von Neumann.¹⁷ Modal interpretations refute the rigid 'eigenstate-eigenvalue link'¹⁸ and so on. In any case, those principles express an ontology which is radically different from our every day understanding of our world.

The second way is more radical and develops new ontology describing the whole physical world. This path follows Bohmian mechanics,¹⁹ Many Worlds²⁰ interpretations, or Collapse theories.²¹ They explicitly introduce new ontology, either at the quantum level, or at a cosmic level. Physicists do not like the concept of Metaphysics. Any quantum interpretation is strictly and necessarily metaphysical, but this, however, is not how physicists like to think. They question the problem through mathematics; develop their ontology by giving ontological meaning at certain parts of quantum mechanical formalism. They achieve the development, more or less, a self consistent explanation, but none of which could be preferable, because their ontology is not integrated with the rest experience of the human civilization.

Confronting this problem, we propose an alternative approach. Our point of departure is not the formalism, but an already developed ontology. This is an ontology still based on the observation of the physical world, but uses different methods than contemporary science. This method is not completely analytical, but it is based on a combination of intuitive, conceptual and analytical approach to the problems. It is the way a basketball player computes and makes a shooting, the way ancient Greeks built Acropolis. Ancient and Medieval Greeks developed the ontology of Logos to communicate their understanding of how physical world works. This usage of the notion of logos usually passes unnoticed, as it is overridden by the intense use of divine Logos in Christian Theology. But in the background of theological conflicts, ontology of logos of a natural being has been developed to a complete system that was able to describe both spiritual and the physical world of senses.

The ontology of logos

It is usual to say that father of the concept of logos (in Greek *λόγος*, which is translated in English as word, but we will prefer to use type logos and his plural logi), is Greek philosopher Heraclitus from Ephesus (535 - 475 BC). It's hard to believe that a single person could conceive such a revolutionary, in those times, thought, as the following:

“This world-order [*cosmos*], the same of all, no neither god nor man did create, but it ever was and is and will be: ever living fire, kindling in measures and being quenched in measures.”²²

Heraclitus and others pre-Socratic philosophers expelled divine action from the world and formulated for the universe a natural way of being and evolving. Heraclitus was a step forward from his ancestors. Among others, he first made a basic distinction between the “stuff” universe is made and the principle that controls the way this stuff evolves and the beings become to existence. This stuff was fire and the principle was Logos.²³ Everything is becoming according to Logos and, if we speak in contemporary terms, Logos includes all information that controls life and evolution of all beings. We can call this information “active information” because it is strongly connected with beings and constitutes them, it makes them exist. As far as Heraclitus is concerned, fire and logos are not divine, they are somehow material.²⁴

Soon after the stuff of the universe was separated from the formatting principle, the latter became divine, immaterial and even constituted a completely separated world, the Plato world of ideas. Ideas were not only separated from beings, but they had a more analytical structure. There was not an abstract idea that controls the world, but there were many ideas, and each one, controls all the similar beings. Plato's system was more complicated than Heraclitus, but yet not enough. The emphasis was put on the separation and superiority of the divine world of ideas, from the physical world, the separation of the principle that controls the universe, from itself.²⁵

Stoics rejoined the controlling principle with the physical world, reusing the concept of logos for their ontology. Logos is inside beings and it is divine even though it was material. Beings and God are completely united, this was typical pantheism.

“In accord with this ontology, the Stoics, like the Epicureans, make God material. But while the Epicureans think the gods are too busy being blessed and happy to be bothered with the governance of the universe, the Stoic God is imminent throughout the whole of creation and directs its development down to the smallest detail. God is identical with one of the two ingenerated and indestructible first principles (*archai*) of the universe. One principle is matter which they regard as utterly unqualified and inert. It is that which is acted upon. God is identified with an eternal reason (*logos*, Diog. Laert. 44B) or intelligent designing fire (Aetius, 46A) which structures matter in accordance with Its plan.”²⁶

The major contribution to the evolution of the concept of logos was made by Philo of Alexandria, 20 BC - 50 AD. He and his contemporary Jewish theologians, tried to harmonize Jewish theology with Greek philosophy. He combined the concept of Jewish God with the concepts of logos and ideas. He joined logos with ideas and

distinguished Logos, as the principle of all beings, from idea-logos the ontological principle of every separate being. Logos was connected with God, and became the ultimate power of God, the Son of God. Ideas were renamed to logi and were the ontological background of every being. Logi were pictures of beings, established at the mind of God, and Logos created beings according to these logi.²⁷

“For the world has been created, and has by all means derived its existence from some extraneous cause. But the word (logos) itself of the Creator is the seal by which each of existing things is invested with form. In accordance with which fact perfect species also does from the very beginning follow things when created, as being an impression and image of the perfect word.”²⁸

“For the Father of the universe has caused him to spring up as the eldest son, whom, in another passage, he calls the firstborn; and he who is thus born, imitating the ways of his father, has formed such and such species, looking to his archetypal patterns.”²⁹

Logos is expressed through logi, and logi are unified in Logos. From then on, the ontology of logos follows this scheme: Logos is the ontological background of logi, which are the ontological background of beings. The dissociation of Logos to logi was developed by Christian theology. Logos became the second person of Holy Trinity and monopolized their interest. Albeit, they used the concept of logos quite often, trying to describe God’s connection with beings. That was a major problem for ancient Christian theology, which confronted the problem of evil, as a result of the tight connection of Creator with creation.

Origen (185–254 AD) did not use logi to solve the problem of evil, he preferred the concept of souls,³⁰ but he confirmed definitely that, for every being, there is his logos and he associated logi of being, with epistemology. He taught that human mind can “see” the logos of being through “φυσική θεωρία”, which can be translated as natural contemplation. Heraclitus first associated logos, with a certain state of human mind, but it was Origen and his pupil Evagrius Pontikos, who developed in details the interaction of state of human mind and the “vision” of logi of being.

The theory of logi of Maximus the Confessor

Maximus the Confessor (580-662 A.D.), was the Christian theologian who used the most the concept of logos in his work. We owe him the detailed and subtle record of the use of logos of natural being. He didn’t make any radical contribution to it, but he pushed to the end the various properties of logi of being that were previously introduced, as he intended to develop his theological framework. He uses the concept of logos of natural being for two major goals. The first was to correct theology of Origen³¹ and the second, to express the ascetical and mystical experience of religious life.³²

The problem of Origen is correlated with the problem of Evil. Origen taught that Logos-Creator created a spiritual world that consisted of souls. This world was (almost) perfect, but somehow, the souls got bored and tried to rebel against the Creator who punished them to be imprisoned to bodies and matter and so had been produced all beings we see. Logos has been embodied to Jesus Christ to give

manhood a second chance and, finally, at the end of time, all beings will recover their spiritual nature.

There were many problems, in this scheme of Origen. The most important was that there was confusion between Creator and creation, because in this scheme God and souls are co-eternal. The radical distinction between God and World is the strongest characteristic of Judith-Christian theology. Another characteristic is that God is perfect and everything He does (must be) perfect. The world we observe is not perfect, so there is a problem. Origen tried to solve this problem with the teaching of the fall of souls but confused Creator with creation. To avoid these problems, Maximus uses the ancient distinction between the stuff that the beings are made of and the principle or pattern that shapes this stuff. So he used the concept of logi that govern the way that beings are made and evolved.³³

If logi constitute a world outside God, there must be a time when they didn't exist, so we must assume that there was a change at the state of God. The time before the creation of logi, God was not a Creator and after that time, He became a Creator. That was unacceptable for Maximus and his contemporary people's vision of God. So he declared that logi are God's wills which are co-eternal in God's mind.³⁴ At a point that is timeless, God created the beginning of time and logi started to be expressed as beings. With this scheme, God is always a Creator and the material creation is not co-eternal. But the problem of Evil remains.

Logi and beings are very strongly correlated, and logi are very strongly joined with Logos. Logi and beings are interacting and continuously evolving and the whole creation is moving to a certain point, which is Logos.³⁵ So Logos is simultaneously, the beginning and the end of the motion and evolution of all beings. Logos, as the end of evolution, offers a kind of restoration of everything, and Maximus believed that the problem of Evil is solved.³⁶ However, it is not, because there still is a lot of suffering that cannot be explained. Maximus offered an explanation; all that we suffer is given by God to make for us necessary the spiritual world.³⁷ A medieval person could accept that, but such an image of how God acts, is hardly acceptable by a contemporary man.

Maximus supported his theological scheme by taking advantage of the ontology of logos as it was developed by previous philosophers and theologians. By doing so, he gave us many details about it. He declared that logos of every being is the ontological background of all of his physical properties.³⁸ He described the hierarchical levels that exist in every logos, a scheme that we call tree-structure of logi of beings. More specifically a logos which is the result of synthesis of other partial logi, it is the ontological background of the synthesis of the partial logi, he controls them as they evolve to constitute him.³⁹ This property of logi was very important for him, because he believed that the power that pushes the evolution and motion of beings is not at the beginning of history, but at the end. For Maximus it is God-Logos who attracts the beings to Him and makes them move.

Maximus understood logi as God's wills that are inside His mind, but he also believed that human mind is capable to "view" them through natural contemplation.⁴⁰ Ascetical life refines human mind and it passes from natural contemplation to mystical contemplation,⁴¹ which assures that logi have a real existence. Maximus

established his “logical” realism to the ascetical experience. This is quite important for us, because it allows us to use the distinction between facts, explanation and ontology that we’ve mentioned previously. We can accept the empirical core of Maximus Theory and interpret differently the explanation and the ontology.

Such an interpretation of Maximus teachings, leads us to summarize that logos is a hidden pattern that controls the beings and reality, logos in his original meaning that has been introduced by Heraclitus is information that is active, that is expressed as a being. Logi are not concepts, but they are real, information has self existence. Logi (information) have inner structure, they are organized at hierarchical levels and these levels make the tree of logi, the ontological tree of our universe, which has a construction from bottom to top. The top of it, it is down, it is his foundation. The top of this tree supports the whole tree, it is a reversed tree. For Maximus, the top of the tree which supports it is God-Logos, the basis, the beginning and the end of everything.⁴²

This property has important physical consequences. Logos of a being, which is constituted by other beings, controls the logos of these beings and makes them to constitute it. The cause of a fact can be in the future. In theology we call it eschatology. This can be understood only if we interpret Maximus doctrine that logi are sited at God’s Mind. Orthodox theology determines logi as “aktistoi” because they co-exist with God. That means that they are not simply eternal. Eternal is something that remains the same as the time passes. Logi do not remain the same, they evolve, but they are outside time and space. About logi there is no meaning for before and after. A composite logos controls the logi which consist him. It is the cause of their evolution, but when it is expressed at space-time, the (composite) entity that it controls, appears in time, after its components. Causality is independent from the arrow of time.

Every being is attached with its logos. It is more accurate to say that a being, is a composite being, it is logos-information expressed as a (material) being in space-time. Logos interacts with other logi but this life of logi, is taking place outside time and space. Logi have an inner structure, which is inverted from a point of view inside space-time. Life of logi gives to beings special properties that are revealed to human mind under special conditions. A human mind that is properly exercised, can feel all these. Throughout human civilization, there are evidences of deep feeling of an inner side of all beings. This experience is interpreted in Medieval Greek philosophy with ontology based on logos. This ontology was strongly correlated with Christian theology but ontology of logos, pre-exists Christianity. It is a common denominator of the whole Ancient and Medieval Greek Philosophy. If it is necessary to introduce metaphysics in Physics, ontology of logos is an appropriate candidate.

The Hypothesis of logical quanta

To visualize ontology of logos, we used the scheme of an inverted ontological tree. As we are going up we can find logi of fundamental elements of our world. We can find logi of elementary particles. So we can speak about logos of quantum particle. Such a particle is an entity that it is not correlated with macroscopic environment. The Hypothesis of Logical Quanta (HLQ) says that a quantum particle is a logos disconnected from the ontological tree, it is a pure logos not connected with an entity

that exists at space-time, it is pure information which has not yet been expressed at space-time. Such a pure logos is a potential entity. HLQ answers the basic question of any interpretation of quantum mechanics; what a quantum particle is, and the answer is that it is a logos, that a quantum particle is pure, yet unexpressed, information.

Quantum entities as logi, have the properties of logi. They “exist” in a special space; we can call it “logical space” with no spatial or time coordinates. Even so, they evolve and interact with other logi, both with pure logi, other quantum entities, and logi connected with beings, macroscopic entities. The projection of pure logos to space-time is expressed by Schrödinger equation.⁴³ Schrödinger equation does not describe the evolution of a “real” entity, but the projection to “real” world of the timeless evolution of a logical entity. It is important to emphasize that logical space and space-time are rigidly connected and that ontological cause, lies in logical space. Ontological background of every physical entity is his logos. Every entity has its own logos, and as every entity is constituted by other entities, every logos is a synthesis of other logi. We can say that beings float at a sea of logi, they are the visible top of an “iceberg”.

With the conceptual equipments that HLQ gives us, we can interpret various quantum mechanical issues. First, we can explain the collapse of the wave function. It is equivalent with the question what and why happens, when a quantum entity ends being in superposition and it changes into a classical entity. HLQ explains that it happens, when a quantum entity-logos is connected with the ontological tree. A composite logos controls the logi that compose it. When a “free” logos is connected with the ontological tree, it is no longer free and is under the action of composite logos. This action causes the collapse of wave function. Because of this action, a pure logos is expressed to an entity, and is correlated with the composite macroscopic entity, the measurement apparatus. This statement entails that we have a phase transition that happens as a quantum entity is correlated with a macroscopic entity.

The wave-particle duality is well understood, if we consider that the logi of every quantum entity, more accurately of every (elementary) particle, however massive it could be, are all together within the same dimensional space, a space without spatial and time coordinates, and constitute a “logical fluid” with defined wave properties. In two slit experiment, there may be always one entity at a time, but the logi of all particles are all together, so that it behaves like a wave. Our interpretation contradicts complementary principle, in our case an electron is neither wave, nor particle, it is logos that interacts with logi of apparatus and appears to be either a particle, or a wave even both as wave and particle.

Non locality and delayed decision, or non catastrophic measurements are easily understood by the non spatial or time coordinates of logi. At every instant, a quantum entity through its logos communicates with every single part of the experimental apparatus and it corresponds instantly with anything that happens in it. From the point of view of an observer that stands in space-time, it looks as if the quantum entity knows what will happen, or observer’s action changes the past. Entangled particles are particles that have the same logos, or better, their logi are tightly connected.

As far as we can consider HLQ, we cannot explain the values of probabilities that we take by the Schrödinger’s equation solution. But no other interpretation does it. We

can only comment that, if the wave function ψ were a real function and quantum entities were localized at phase space, it is hard to think how the diversity and complexity of our world could arise from quantum world. Schrödinger's equation probabilities and Uncertainty Principle loosen the connection between quantum entity and information which is included in its logos. All elementary particles are undistinguishable and their logi include the same information. It is necessary, for our world to exist, that this information should be expressed in various ways.

HLQ arises from a metaphysical background, but it is not more metaphysical than other interpretations. One could notice that, every particular implementation of HLQ exists in similar form in other interpretations. Bohm's dynamic and quantum potential have common properties with logi. But there is a very important difference. Logi is a characteristic of every being and not only of quantum entities. Logi is not a set of hidden variables, but includes every variable. Modal interpretations give primary role to the apparatus, even if they offer no ontology for their claims. Other interpretations suggest actions which reverse the time arrow⁴⁴ and so on.

There are strong indications supporting HLQ from other scientific fields. Many physicists suggest that information is crucial for the structure of Universe.⁴⁵ There is also Holographic Principle that potentially gives a mathematical meaning to "logical dimensions."⁴⁶ The creative role that Ilya Prigogine gives to the arrow of time and the concept of emergence,⁴⁷ that is very popular nowadays, has a lot in common with the action of logos.

Most supporting to our Hypothesis is the work of Roland Omnès, who concludes his analysis with the necessity of distinction between reality and logos, the formatting principle, but he says: "The notion of logos is obviously insufficiently developed and is rather questionable. We shall see however that it offers a possible way out of several problems."⁴⁸ I think that Omnès is not familiar with the complete ontology of logos as it was developed by Medieval Greek philosophy.

Human mind and Unification of Knowledge

The greatest merit with HLQ that was developed by ancient philosophers and finally, declared by Maximus, is the aspect that human mind is created or evolved with the ability to "see" logi of being. Reality has many levels of organization and many points of view. HLQ suggests that all levels and all perspectives of Reality are based on information. This information is not the kind that contemporary science of information studies. As Antony Zeilinger proved, there is information that cannot be expressed by bits.⁴⁹ This is a strong indication that there is information of a different kind than the usual we know in our everyday life. Information, we are talking about, has inner structure and is self existent. These points drive us to our next step of understanding.

Information of a composite logos, is more than the sum of partial information that is included at the logi that compose it. This is a result of quantum mechanical formalism, but it can be extended to logi of macroscopic entities.⁵⁰ A composite logos has new functionality and new relations to other logi of beings. As we move downwards the ontological tree, from one level to the other, an active information excess is always produced. The more complicate is a being, the more information

excess it includes. Talking about the human brain, which is the most complicated structure in the known universe, we can consider the information excess it possesses. This excess could be the cause for whatever we call free will.

Considering the above it seems very tenable to suppose that a mind is the result of the “logical structure” of brain, the logi of entities of the physical structure of brain. Memories could be stored and processed in it. It is not the biochemical structure of brain that stores and processes information and produces the mind, but the structure of logi beneath it. Connections and interactions between logi of neurons are more stable than connections of neurons. Procession of information could be made by logi of whole parts of brain. This model is flexible enough to explain the way mind arises from brain. HLQ shows us new ways of research in this field. They are ways that are established on physical structure of brain, but are not restricted by it.

If this model is valid, it follows that the mind has access to “logical space”. Whatever we call spiritual life or activity, is taking place in it. This scheme, if developed, can give us answers about the nature of mathematics, intuition, art and every phenomenon we characterize as spiritual. We can develop a unified approach of various aspects of human civilization based on a certain interpretation of quantum mechanics. That doesn't mean that spiritual phenomena have a quantum mechanical structure or explanation, as it is often said. HLQ gives a special role to information. This role opens new ways of understanding the way brain works. These ways need to be explored with scientific method to find out what is really going on.

Science and religion

HLQ offers us an opportunity to understand scientifically religion, without denying his experiential reality. It allows us to distinguish experiential reality of God, from ontological reality of Him. Traditional theologies interpret God in terms of Creation. God is a concept that explains the existence of the world and deep feelings and facts of communication with Him. Every civilization develops an explanatory model about God, based on its knowledge about how it is the world and the man. This model is thought to be an ontological reality and evolved to a doctrine believed by the particular civilization.

Nowadays, reality of world and human nature, have been proved very complicated and contradictory. All these models about God transfer these contradictions to God's nature. It is the well known problem of evil. Religions cannot overcome it with a rational way and they are driven to logical deadlock. This deadlock drives contemporary man to reject religion edifice, leaving a serious psychological emptiness. HLQ help us to construct a model about God that is logically consistent and includes religion experiences accepting them as real.

As we have noticed in previously, causality lies in logical space and is outside time. Causality follows the arrow of time only phenomenological and has nothing to do with it. The necessity of Creator is due only to human perception. The question of who created the world is pointless. Medieval theologians thought that logi are inside God's mind. We can unite God with His mind, the logical space. It is not a complete answer to the question, what or who God is, but it is flexible enough and gives us the possibility to understand religious phenomena, like prayer and mystical experience.

Human mind has the ability to access logical space, in other words, God's mind. This ability, as all abilities of human beings, can be cultivated and developed and can produce strong feelings to the person that practices it. These feelings produce the mystical vein of every religion. The act of accessing logical space is understood, as a special kind of communication and it is described, as prayer. Every religion and civilization expresses all these empirical data with its own theological and philosophical concepts. It is not hard to understand that a person with a special gift can develop his ability to communicate or interact through logical space with other persons, or with previous or future facts. These and many others, quite unusual facts, can be explained with the aid of HLQ, without denying our naturalistic view of the world.

HLQ is a proposal that it is strictly defined at the field of quantum mechanics. It is indisputable that it is a metaphysical one, but there is no self consistent way to avoid metaphysics, if one aims to face the question of what a quantum entity is. By accepting HLQ, we grasp a powerful tool to explain emergence of life and mind. We give information the status of matter and energy, but we need a formalism to describe its inner structure. If we achieve this, we could construct a proper model about the connection of mind with brain. At this time, HLQ is a way that needs to be explored towards the various directions that are in front of us.

Bibliography

Afshar, S. S., "Sharp complementary wave and particle behaviours in the same welcher weg experiment", *IRIMS preprint*, May 2003. <http://www.irims.org/quant-ph/030503/>

Albert, David, *Quantum mechanics and Experience*, Harvard, 1994

Atmanspacher, Harald and Primas, Hans (2002), "Epistemic and Ontic Quantum Realities". *PhilSci Archive*, ID cod 938

Barrett, Jeffrey, "Everett's Relative-State Formulation of Quantum Mechanics", *Stanford Eyclopedia of Philosophy*, <http://plato.stanford.edu/entries/qm-everett/>

Barrow, J., P. Davies, Jr. Harper, Science *Ultimate Reality, Quantum Theory, Cosmology and Complexity*, Cambridge University Press, 2004

Bayer von Hans Christian, *Information the New Language of Science*, Phoenix Orion Books, 2004

Bohr (1935), "Quantum Mechanics and physical reality", *Quantum Theory and Measurment, Princeton Series in Physics*, Princeton, New Jersey 1983, p. 144

Borgen, Peder, *Philo of Alexandria*, Brill Academic Publishers, Brill 1996

Cartwright, Nancy, *How the Laws of Physics Lie*, Claredon Press, 19863

Clauser, John F., "De Broglie wave interference of small rocks and live viruses", *Experimental metaphysics, Quantum Mechanical Studies for Abner Shimony*,

Kluwer Academic Publishers Vol 193, p. 1

Cramer, John G., "An Overview of the Transactional Interpretation of Quantum Mechanics", *International Journal of Theoretical Physics* 27, 227 (1988)

Cramer, John G., "Velocity Reversal and the Arrow of Time", published in *Foundations of Physics* 18, 1205 (1988)

Cushing, James T. *Philosophical concepts in Physics, The historical relation between philosophy and scientific theories*, Cambridge University Press, 1998

Durr, D. S. Goldstein and N. Zanghi, "Bohmian mechanics and the wave Function", *Experimental metaphysics, Quantum Mechanical Studies for Abner Shimony*, Kluwer Academic Publishers, p. 32

Egan, Harvey D., *An Anthology of Christian Mysticism*, Pueblo Book, Liturgical Press 1991

Einstein, Podolsky, Rosen (1935), "Can quantum-mechanical description of physical reality be considered complete?" , *Quantum Theory and Measurment*, Princeton Series in Physics, Princeton, New Jersey 1983, p. 138

Everett, H., 1957a, *On the Foundations of Quantum Mechanics*, thesis submitted to Princeton University, March 1, 1957

Feynman, Richard, QED, Princeton University Press, 1985, translated in Greek, Trochalia 1988

Ghirardi, Giancarlo "Collapse Theories", *Standford Eyclopedia of Philosophy*, <http://plato.stanford.edu/entries/qm-collapse/> <http://plato.stanford.edu/entries/qm-collapse/>

Ghose, Partha, *Testing Quantum Mechanics on New Ground*, Cambridge University Press, 1999

Hawking, Stephen, Roger Penrose, *The nature of Space and Time*, Princeton University Press, 1996

Heisenberg, Werner, *Encounters with Einstein, and other essays on people, places and particles*, Seabury Press, 1983

Heisenberg, Werner, *Physic and Philosophy*, Penguin Classic3, Great Britain 2000

Hey, Tony and Patrick Walters, *The Quantum Universe*, Cambridge University Press, 1987

Jammer, M., *The Philosophy of Quantum Mechanics*, New York, Wiley 1974

Kraut, Richard, *The Cambridge Companion to Plato*, Cambridge University Press

- Landaou, Robert and Menas Kafatos, *The Non-local Universe*, Oxford University Press, 1999
- Laughlin, Robert B., *A Different Universe, Reinventing Physics from the Bottom Down*, Basic Books, New York, 2005
- Long, A.A., *The Cambridge Companion to Early Greek Philosophy*, Cambridge University Press, 1999
- Louth, Andrew, *Maximus the Confessor*, Routledge 1996
- Messiah, Albert, *Quantum Mechanics*, Dover Publications, Inc. Mineola, New York, 1999
- Migne, Patrologia Graeca volume PG 90 and 91
- Minkel, J. R., “The hollow universe”, *New Scientist*, issue 2340, 27 April 2002, page 22
- Minkel, J.R., “The top-down Universe”, *New Scientist*, issue 2355, 10 August 2002, page 28
- Moore, Edward, *Origen of Alexandria and St. Maximus the Confessor*, Boca Raton, Florida 2005
- Mouraviev, Serge, “The Hidden Patterns of the Logos”, *The Philosophy of Logos*, Volume 1 Athens 1996, p. 148
- Murchu, Diarmuid o’, *Quantum Theology, Spiritual Implications of the New Physics*, The Crossroad Publishing Company, New York, 2004
- Omnès, Roland, *Interpretation of Quantum Mechanics*, Princeton University Press, 1994,
- Omnès, Roland, *Quantum Philosophy: Understanding and Interpreting Contemporary Science*, Princeton University Press, 1999
- Penrose, Roger, Abner Shimony, Nancy Cartwright, Stephen Hawking, *The Large, the Small and the Human Mind*, Cambridge University Press, 1997
- Penrose, Roger, *The Road to Reality*, Jonathan Cape London, 2004
- Penrose, Roger, *The Shadows of the Mind*, Oxford University Press, 1994
- Pierris, A. L., “Logos as ontological principle of reality”, *The Philosophy of Logos*, International Center for Greek Philosophy and Culture, Athens 1996, Volume II
- Powers, Jonathan, *Philosophy and New Physics*, Routledge 1991
- Redhead, Michel, *From Physics to Metaphysics*, Cambridge University Press, 1995

Runia, D.T., *Philo and the Church Fathers: A Collection of Papers*, Brill Academic Publishers, Brill 1995

Runia, David T., "*Philo, Alexandrian and Jew*," *Idem, Exegesis and Philosophy: Studies on Philo of Alexandria* (Variorum, Aldershot, 1990)

Sandywell, Barry, *Presocratic Reflexivity: Logological Investigations*, Routledge (February, 1996)

Selleri, Franco, *Die Debatte um die Quantentheorie (Facetten der Physik)*, F. Vieweg (1983), Translated in Greek, Gutenberg, 1986

Sherwood, Polycarp, *St. Maximus the Confessor, The ascetic life, the four centuries on charity*, Newman Press, N.Y.

Stonier, Tom, *Information and the Internal Structure of the Universe*, An Exploration into Information Physics, Springer-Verlag, 1990

Talbot, O Michael, *The Holographic Universe*, Harper Collins Publishers, London 1996

Tanona, Scott, "Idealization and Formalism in Bohr's Approach to Quantum Mechanics", *Philosophy of Science*, Vol. 71, number 5 p. 683

Thunberg, Lars, *Microcosm and Mediator, The Theological Anthropology of Maximus the Confessor*, second edition, Open Court, Chicago and La Salle, Illinois, 1995

Valtazar, von Hans Urs, *Cosmic Liturgy, The Universe According to Maximus the Confessor*, Communio Ignatius, translated from German, Brian E. Daley, S.J. 2003

Wheeler, John Archibald and Wojciech Zurek, *Quantum Theory and Measurement*, Princeton Series in Physics, Princeton, New Jersey 1983

1 Roger Penrose 1994, p. 305, (g.e.)

2 Rolland Omnès 1999, p. 161

3 Alison George, *Lone voices special: Take nobody's word for it*, An interview with the Nobel winner Brian Josephson, issue 2581 of New Scientist magazine, 09 December 2006, page 56-57

4 Physics and the Real World, Ellis, George F R. This paper was prepared for "Science and Religion: Global Perspectives", June 4-8, 2005, in Philadelphia, PA, USA, <http://www.metanexus.net/conference2005/pdf/ellis.pdf>

5 There are many such examples, like Diarmuid o' Murchu, 2004

- 6 In quantum mechanics we talk about and distinguish formalism and interpretation. James T. Cushing, 1998 p. 439 (g.e.)
- 7 Roland Omnès 1999, p. 124.
- 8 David Albert, 1992, p. 30
- 9 Werner Heisenberg, 2000, p. 14
- 10 Jenann Ismael, “Quantum Mechanics”, *Online Stanford Encyclopedia of Philosophy*, <http://www.science.uva.nl/~seop/entries/qm/>
- 11 This effect is well shown in the two-split experiment, Penrose, 2004, p. 504 and a very good description at Tony Hey and Patric Walters 1987 p.22 (g.e).
- 12 It is the known Wheeler’s delayed-choice experiment, Robert Nadeau and Menas Kafatos 1999, 50 and Penrose 2004, p. 512.
- 13 Detailed description Penrose 1994, p.309 (g.e.)
- 14 Jan Hilgevoord and Jos Uffink, *The Uncertainty Principle*, First published Mon Oct 8, 2001; substantive revision Mon Jul 3, 2006, SEP, <http://plato.stanford.edu/entries/qt-uncertainty/>
- 15 Roland Omnès 1999, p. 149.
- 16 Jonathan Powers, 1995, p 177 (g.e.)
- 17 David Albert, 1994, p. 80.
- 18 Michael Dickson, 1998, p. 88
- 19 David Albert, 1994, p.135, Franco Selleri, 1983 p. 59 (g.e.)
- 20 Lev Vaidman, “Many World Interpretation”, *Stanford Encyclopedia of Philosophy*, First published Sun 24 Mar, 2002 <http://plato.stanford.edu/entries/qm-manyworlds/>
- 21 Giancarlo Ghirardi, “Collapse Theories”, *Stanford Encyclopedia of Philosophy*, First published Thu 7 Mar, 2002, <http://plato.stanford.edu/entries/qm-collapse/>
- 22 Greek text and English translation can be found at <http://www.heraclitusfragments.com/archives/20020801/>, B30
- 23 Edward Hussey, *Heraclitus*, A. A. Long 1999, p. 154 (g. e.) The most characteristic text is B1; “Though this Word (logos) is true evermore, yet men are as unable to understand it when they hear it for the first time as before they have heard it at all. For, though all things come to pass in accordance with this Word (logos), men seem as if they had no experience of them, when they make trial of words and deeds such as I set forth, dividing each thing according to its kind and showing how **it is what it is**. But other men know not what they are doing when awake, even as they forget what

they do in sleep”.

<http://www.heraclitusfragments.com/archives/20020801/files/ge.html>

[24](#) Edward Hussey, *Heraclitus*, A. A. Long 1999. p. 164 (g.e.)

[25](#) Richard Kraut, “Plato”, *Stanford Encyclopedia of Philosophy*, first published Sat 20 Mar, 2004, <http://plato.stanford.edu/entries/plato/#PlacenDoc> . It deserve to mention that now days it is controversial if Plato endorses this understanding of his writings. Mark Balaguer, “Platonism in Metaphysics”, first published Wed 12 May, 2004, *Stanford Encyclopedia of Philosophy*, <http://plato.stanford.edu/entries/platonism/>

[26](#) Dirk Baltzly, “Stoicism”, *Stanford Encyclopedia of Philosophy*, first published Mon Apr 15, 1996; substantive revision Mon Dec 13, 2004 <http://plato.stanford.edu/entries/stoicism/>

[27](#) David T. Runia, "*Philo, Alexandrian and Jew*," Idem, *Exegesis and Philosophy: Studies on Philo of Alexandria* (Variorum, Aldershot, 1990),

[28](#) ON FLIGHT AND FINDING 12.1, translated by Charles Duke Yonge London, H. G. Bohn, 1854-1890. <http://www.earlychristianwritings.com/yonge/>

[29](#) ON THE CONFUSION OF TONGUES, 63.1
<http://www.earlychristianwritings.com/yonge/book15.html>

[30](#) Edward Moore, “Origen of Alexandria” (185 - 254 A.D.), *The Internet Encyclopedia of Philosophy*, <http://www.iep.utm.edu/o/origen.htm#H7>

[31](#) Hans Urs von Valtasar, 2003, p. 127.

[32](#) Polycarp Sherwood, p. 81.

[33](#) This scheme is known as “double creation”, Lars Thunberg, 1995, p. 151.

[34](#) Lars Thunberg, 1995, p. 64.

[35](#) Hans Urs von Valtasar, 2003, p. 135.

[36](#) Lars Thunberg, 1995, p 145.

[37](#) PG 91, 1104A

[38](#) PG 91 1229

[39](#) PG 90, 447

[40](#) PG 91, 1228

[41](#) PG 90, 1133 A

- [42](#) It is a reverse of Origen's myth; Hans Urs von Valtasar, 2003, p. 133 and p. 154.
- [43](#) Roger Penrose 2004, p. 498
- [44](#) John G. Cramer, 1988
- [45](#) Tom Stonier, 1990
- [46](#) By Amanda Gefter, "The elephant and the event horizon", From issue 2575 of *New Scientist magazine*, 26 October 2006, page 36-39,
<http://www.newscientist.com/channel/fundamentals/mg19225751.200-the-elephant-and-the-event-horizon.html>
- [47](#) Robert Nadeau and Menas Kafatos, 1999, p. 113.
- [48](#) Roland Omnès, 1994, p. 527.
- [49](#) Anton Zeilinger, University of Vienna, Why The Quantum? "It" from "Bit"? A participatory universe? Three far-reaching challenges from John Archibald Wheeler and their relation to experiment, *Science Ultimate Reality, Quantum Theory, Cosmology and Complexity*, p. 211.
- [50](#) Michael Redhead, 1995, p. 51. (g.e.)