

## Relationship between mind and brain: A proposal of solution based on forms of intra- and extra-individual negentropy

### La relación mente-cerebro: Una propuesta de solución basada en formas de negentropía intra y extra individuales

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## Summary

It is proposed that the problem of the mind-brain relationship can be overcome by a non-classical materialistic model of personality based on the information defined as a special form of negentropy with a structure and activity, which in five intra-individual categories, organizes all and each of the levels of the personality, and, in an extra-individual category organizes the society. This concept of information leads to a monistic view of the universe and turns into conceptions of society, personality, consciousness, and mental activity based on a theoretical framework that explains the nature of the social individual.

**Palabras clave:** Mind-brain problem, personality, conscience, information, negentropy.

## Resumen

Se propone que el problema de la relación mente-cerebro puede ser superado por un modelo materialista, no clásico, de la personalidad, basado en la información definida como una forma especial de neguentropía, con una estructura y una actividad que, en cinco categorías intraindividuales, organiza a todos y cada uno de los niveles de la personalidad, y que, en una categoría extraindividual, organiza a la sociedad. Ese concepto de información conlleva a una visión monista del universo y deviene en concepciones sobre sociedad, personalidad, conciencia y actividad psíquica basadas en un marco teórico que explica la naturaleza del individuo social.

**Palabras clave:** Problema mente-cerebro, personalidad, conciencia, información, neguentropía.

## Introduction

The mind-brain problem lies in the question asked in the following way: how a conglomerate of matter (the brain) can create our mental world? (Ward, 2006) that is, how a physical substance can originate, among other many physic phenomena, thoughts, emotions and moral values? For some people, a brief way to summarize it could be by asking, how a material thing can be related to an immaterial thing? This article is aimed at revising the evolution of concepts on mind, brain and on the mind-brain relationship, proposing critiques of such ideas, and finally, presenting a theoretical model as a research hypothesis that can be used in the solution of the issue in question.

The so-called mind-brain problem has been discussed by philosophers, neurologists, psychiatrists, linguists, neuro-scientists, etc. The skepticism, when addressing the question within the interdisciplinary framework, and the heterogeneity in these communities of scientists have been obstacles to get answers.

It is worth mentioning that the mind-brain problem is not a matter of concern for most of the scientific and professional community. A clinical psychologist will change with difficulty his techniques of evaluation or intervention due to discoveries in this field. However, the philosophical community is the one that can be most concerned about this issue.

### **Concepts on Mind and Brain.**

It is possible that, in the history of human knowledge, the response on the relationship between mind and brain would remain elusive for a long time due to the nature of the question. When saying the word *mind* there is a great lack of definition of the concept evoked. (MacDonald, 2003; Ortiz, 2010) and, less obvious lack of definition, when saying *brain*. The same occur with the concept of the word intelligence: there are numerous and different adjectival, noun and empty concepts (Ortiz, 1999).

There is a great variability of connotations of the word *mind* in old and current languages: *mens* (in Latin: mythological figure that personified the correct thinking, with its derivatives *memini* = memory, *moneo* = advise); *menos*, *menomai* (in Greek: intense desire), *minne* (in a German way: friendly love, sensual), *men*, *mon* (in Indogermanic: to think, remember, try); *manas*, *gamunds* (in Sanskrit: to think); *gemynd* (in Old English: mind), *gamunds* (in Gothic: memory). The position of the American Psychiatric Association could not be called eclectic but honest and humble pragmatism. It is a renowned institution which states with resignation that, since there is no a better concept, the concept of “*mind*” is still used in the fifth version of its Diagnostic and Statistical Manual (American Psychiatric Association, 2004).

In turn, the ideas on the word *brain* have been historically developed but in a more specific manner and, literally palpable on its main constituent structures (cerebral hemispheres, brainstem and cerebellum), covers and the central intracranial anatomical position. These morphological data were systematized based on the macro- and microscopic findings in studies more and more sophisticated of animal or human corpses and, from the 20<sup>th</sup> century, based on the studies of internal static or dynamic internal images of the brain of patients and normal people. As expected, the concepts on brain have varied from the most extensive to the most limited, that is, from the comparison of the function of all the body organs, to the function of the nervous system organs in general, to that of the brain in particular and more specifically, to the structure of the cerebral cortex that is more relevant since most ideas on mind mainly refer to the processes of the psychic activity. It is worth mentioning that brain models have made it look like the products of technological advances throughout history from considering a brain functioning based on the hydraulic and dioptric physics to a computational functioning (Ortiz, 2010).

### **Critique of Mind Conceptions.**

Frequently based on a mere datum (sometimes only statistical, sometimes only qualitative, introspective and ingenuous), an ideal or conceptual object called construct is achieved, that is, a type of equivalence of cerebral processes. Several constructs are articulated in an *ad hoc* manner to form a theory in which they, the constructs, fit in an arbitrary manner (Bunge, 1974).

The use of the word mind in the fifth edition (DSM V) of the Statistical Diagnostic Manual of Mental Diseases implies making a distinction between *mental* disorders and *physical* disorders, which is a reductive anachronism of the mind/body dualism (Simón, 1999). In short, there have not been a majority, scientific, explicative and more or less satisfactory definition of *mind*; and, however, it is still being used since it is easy to assume that the concept of *mind* that the other has coincides with one's concept to such an extent that it does not require any additional specification, kind of implicit agreement sanctioned by costume Note also something of great relevance: using the word *mind* leads unavoidably to the lack of definition of the category *mental diseases*.

As with the definition of the word *mind*, it seems to have happened the same with the word soul, the word *intelligence* or *god*. The proposal on the existence of the mind is accepted axiomatically. People talk as if everybody firmly think that they are talking about the same thing. It cannot be said that there is an implicit agreement or an agreement of concepts, but it is about an involuntary but comfortable plurality of elastic meanings. It has stated that a problem of the dualism approaches is the "problem of the existence of other minds", since it is impossible to know if what I have and consider as *my mind* is equal to what the other person calls *my mind* (Braun, 1989).

The reductive positivist approaches end up addressing simple specific, described and proven facts. The idealistic approaches try to deny the existence of the matter; the mechanistic approaches limit the psychic activity to supposed functional mechanisms of the brain. Dualism approaches have

not been able to satisfactorily define the concepts that supposedly are related from the religious (soul-body), classic-philosophic (reason- being) or natural scientific (mind-brain) perspective. When assuming the existence of two independent substances and proposing abstractions based on concepts or believes of common sense, they reach a point beyond which no advance is possible. This is the case of epiphenomenalism (Cabanis, Huxley, Vogt, Ayer), parallelism (Leibniz, Jackson), autonomism (Wittgenstein) and interactionism (Descartes, Penfield, Eccles, Popper).

### **Critique on Brain Conceptions.**

It should be noted that the ideas about the relationship between mind and brain depended, logically, on the concept and knowledge of human brain in each historical stage.

A strictly anatomical naturalist approach of the brain has not be able to and could not explain the psychic activity, and therefore, it could not explain how the activity of such brain is structured by the psychic activity (Ortiz, 2010). Thus, the separatist attempts of the classic neurology and psychology failed. They gradually established a kind of borders that separated the neurological study of “lower functions” such as motility, sensitivity or reflected motor responses and they did not mostly address about the nature of the consciousness, thinking, imagination, knowledge or emotions. On the other hand, psychology invented constructs about the “higher functions” such as memory, perception, conduct, cognition or the behavior without being able to explain what the lower brain functions are. The cognitive neurosciences have been generating empirical data but, since they do not have a theory of higher brain functions, have not moved towards solutions of the mind-brain problem (Gimenez-Amaya & Murillo, 2007; Braun, 2008).

### **Mind-Brain Relationship.**

The importance of solving the mind-brain problem has been considered as the center of all the metaphysic problems (Sperry, 1952) and of the

main problems (Penfield, 1977). The mechanistic and monistic attempts to respond to the question about the relationship between mind and brain have been prepared by the philosophers (Epicuro, Diderot, Hobbes, Quine, Smart, Armstrong, Bunge, Davidson), naturalists (Darwin), neuroanatomists (Gall), physiologists (Flourens), experimental psychologists (Watson, Skinner, Lashley), physiological psychologists (Hebb), histologists (Cajal), neuropsychiatrists (Karl Kleist) and mathematicians (Turing). Generally, in this list it can be observed that there are representatives whose work is aimed at descriptions and explanations of events (Biology, Physiology, Psychology), and other sciences (Philosophy, Logics, Methodology, Mathematics, Cybernetics, Informatics, Semiotics) that are instruments to facilitate the search, preparation and integration of data and knowledge of objective sciences above mentioned (Ortiz, 2010). It can be observed without too much effort that many disciplines are closely aimed at the brain, while others are guides of “impalpable” procedures as a result of the mind.

As expected, the explanations about the main topic to be addressed have been categorized and re-categorized (Bunge, 1985; Ortiz, 2010). Classical monism theories within the mechanism are point of views that consider that the only true reality is the matter and are currently significantly accepted by the neuroscience researchers.

Materialist monism theories of functionalist type from Gall, Flourens, Kleist, Smart, the theory of identity and Putman are presented below. Gall considered that brain functions were located in areas of the brain matter (localizationism) while Flourens proposed that they depended on the whole brain matter (holism). Kleist was one of the proponent of integration of neurology and psychiatry in the 20<sup>th</sup> Century. He proposed theses on the relationship between brain functions and mental diseases. His proposals tried to functionalistically integrate the pathology of the *brain* with the diseases of the *mind*. He received strong critiques and there were very refractory positions that hindered the achievement of an interdisciplinary approach. Essentially,

the *theory of identity* mainly proposed by an Australian philosophical group suggests that mental states are identical to brain states (Armstrong, 2004). It is assumed that one of the reasons for this proposal is a materialist monist conception of reality, and that the second motivation is the attempt to speak about the mental thing in a language similar to that of the physical sciences (Braun, 2009). The lack of definition of what is mental and the ambiguity of the term *neurophysiological* have been criticized to address the physical aspect of the brain. The original concepts of Smart and Armstrong are modified later so that the theory of identity turns into functionalistic theory (Braun, 2008).

Davidson said that every particular mental fact is identical to a particular physical fact. However, he says that the so-called types of mental facts are not identical to the types of physical facts (Davidson, 1970). For example: the affective experience of *sadness* (that we can call *t*) can be identical to a physical fact (that we can call *f*); however, the type of fact *sadness* in which *t* is included, does not correspond to any general type of physical facts.

### **Information Theory of Personality (ITP).**

The proposal of the information theory of personality (Ortiz, 1994) is an articulated group of concepts, proposals and groups of proposals that try to solve the problem of the mind-brain relationship based on the coherence of redefinitions about the specific human being (not the ideal human being but the social one), the consciousness, personality, society and living system in the essential processes of the universe, where the individual systems making up the living system and this as a whole, are doubly determined systems, and such determination depends on the activity of a structure that reflects physical and chemical processes happening inside them and in their current environment; that is, to remain they depend on the internal and external determination processes.

The explanation of this theory begins with the analysis of the basic assumptions that can be summarized and integrated in the following five points:

(1) materiality of the universe, (2) organization of living systems (from bacteria to primates) based on the intra-individual information, (3) organization of the society based on a type of extra-individual information, (4) oneness of the human being as a living system that incorporates extra-individual information in the form of complex intra-individual information, and (5) the total subsequent restructuring of the human individual until turning it into a social individual (Ortiz, 2008). These points are mentioned on purpose as general proposals contravening the strategy of the theory creator.

Be part of the material unit of the universe, that is the point of view of considering that all the inert systems and all the living systems are composed of matter and this has, according to the physics, two aspects: mass and energy, any observer can examine an aspect of structure and an aspect of activity in the matter (Harré, 1967). The structure aspect that refers to the mass that occupies space and the activity aspect that refers to the energy that is changing over time are the two sides of a same coin. When mentioning structure, we will accept that there is a state of certain matter and when mentioning activity, we will accept that there are changes of such state of any matter. These changes, according to the physics, occur permanently since the matter is always changing although we cannot perceive them through our senses. The constant change is, again, an intrinsic property of the matter and it is explained by a constant negentropic trend (to order and/or to organization) and a contrary and constant trend, called entropic (to the disorder and/or disorganization). These trends occur in the matter of all living beings (either a bacteria, a plant or a society) According to the thermodynamic laws, the total entropy of the universe never decreases, is only constant or increases, and besides the matter in the universe is not only created and destroyed but it transforms.

### **Information as a Special Way of Negentropy.**

The tentative response for the above-mentioned questions is that a living system is a material system organized (not only ordered) by information. A human individual can be seen as a living system with trillions of cells

making up tissues that, in turn, make up organs innervated by axons attached to the two main groups of central nervous organs, which are the spinal cord and the brain that has cerebral cortex (a multilaminar structure mainly made of groups of neurons). The foregoing so far is, irrefutably, material, that is made of matter, with two aspects to be detailed: (1) mass of nervous cells, of the matter of its membrane, mass of its cytoplasm, of its cores, of its neurotubules, of the molecules of chemical substances, and (2) energy – the second aspect of the matter– in several forms: mechanical (the entrance or exit of sodium or chloride molecules through existing channels in the neuronal membrane), electrical (the attraction between a molecule with negative charge and one with positive charge, electrical changes or electrical impulses spread across the axons), chemical (many transformations of the glucose (sugar) in the intracellular structure called mitochondrion).

That said, it will be easier to understand that the mass and energy of the cerebral cortex are subject to the same physical-chemical laws of the matter of any hill. However, the difference is that the hill is an inert material system and the cerebral cortex is part of a living material system. The matter of an inert system is ordered or disordered, the matter of a living system is, apart from being ordered and disordered, organized or disorganized.

A living system –as said before– can be called like that when a material system has the attributes of integrity, stability, reproducibility, mutability, memory, anticipation and, essentially, is organized by information (Ortiz, 2010).

The bacteria of the tuberculosis is a cellular individual organized by genetic information, a sponge or a plant are individuals composed of cells and tissues organized by biochemical information in the intercellular liquid. A worm or a fly are organic individuals (or organisms) with cells making up tissues and tissues making up several organs that are organized by existing neural information, such as configuration of axons of neurons, and a mammal

is a psychic individual (or animal psychism), again, with cells making up tissues, tissues making up organs, organs innervated by nervous fibers attached to the cord and brain, but a brain with two hemispheres that have an extensive laminar surface structure called allocortex, which is organized by psychic information as a configuration of neural networks of thousands or millions of neurons grouped in layers in the surface of the gray matter of the allocortex in certain regions of each one of the cerebral hemispheres. Finally, we have the human individual, who when born, is developed to the level of complexity of an animal psychism, but at the end of the adolescence, it will be a social individual (or personality) with cells making up tissues, tissues making up organs, organs innervated by nervous fibers attached to the cord and brain with two hemispheres that have more than one laminar surface structure, the allocortex and neocortex. The latter is organized by a more complex type of psychic information (neocortical) as a configuration of billions of neurons grouped as well.

There are, of course, in all the living systems a subcellular level of atomic and molecular ordering. The foregoing takes us to the first proposal of the Information Theory of Personality (the universe is matter ordered entropic and negentropic processes of which are reflected in their activity).

We has just stated that the living systems or beings are an organized material system based on several types of information. It is worth asking the following question: if the matter of the inert systems is *ordered* by chemical and physical laws of cause-effect type, what *organizes* the matter of a living system so that, it can be called living? What does the organization of a system with the above-mentioned attributes depend on? Ortiz suggests that it is the information. Ortiz proves that such information is a way of reflection of the matter only produced inside the living systems and those are the only ones that can be considered information systems. Then a living system is a “special case of negentropic reflection systems that tend to a greater matter ordering” (Ortiz, 1994). To reach this conclusion about what information

is, Ortiz builds on the contributions of Shannon (1948) regarding the measure of social information, but without defining the essence of the term information in his formal quantitative or probabilistic theory. For Ortiz, from the Shannon's work (1948) it is deduced that he was within a totally idealist conception considering the information as the opposite of probability, that is, as the function of the non-probability of a message.

Ortiz also revised the contribution of Brillouin (1962) who conceptualized the information as the opposite of entropy (negentropy). Other contribution evaluated by Ortiz is the one of Ursul (1972) who considers the relationship between the information and reflection – as property of the matter – proposing which information is the content of the reflection and relating it to the concept of diversity when saying that the information is the diversity an object has over other object. The content would be the result of internal differences of an object that reflects another object, either it is inert or living matter.

Watanabe (1983) disagrees with this last Ursul's conception Ursul and, according to Ortiz, he makes the best concatenated revision of contributions of several authors that can be summarized in the following way:

1. The physical entropy corresponds, in some sense, with uncertainty about the physical state of an object.
2. The reduction of such physical entropy will imply an increase of information obtained by an observer.
3. It is clear that there is a relationship between physical entropy and the type of social information called scientific knowledge.
4. Such relationship is complementary since both are part of a same material process.

5. Math formulas used to express the level of physical entropy also serve to express the level of ignorance and calculate the measure of our surprise. A same formula makes possible that we can measure the quantity of uncertainty and the quantity of information that can be obtained to reduce such uncertainty.
6. Such formulas can serve to carry out the entropic measure of the level of structure.
7. Such measurement can reveal the existence of emerging properties in a group (these properties appear when individuals are in groups of three or more, either molecules making up a fragment of matter or human beings makings up a society), and that such method of analysis of the structure based on the idea of the information contained is susceptible to be applied to more abstract objects as well.

Here Ortiz (1994) makes a very important disquisition:

A conception like this [Watanabe's conception] can be interpreted as a clear separation of matter and human activity that cuts any relationship between mechanisms and idea. But the same conclusion could mean a first attempt to clarify the continuity of the matter motion from inert systems to human society. Consequently, it is an attempt to subsume the one inside the other. We consider that it is important to think that there is only continuity in the development of more complex structures, and that the problem lies in defining from which moment a structure produces or contains information, and under which conditions (p. 38).

### **Society is the only Living System Organized based on an Extra-individual Kind of Information.**

Let's think and imagine not only the phylogeny of the living systems but the course of the determination processes of living systems over time. There have been and there are still processes in which matter is organized from genes, that is, processes in which the activity of simple structures has determined the structuration of complex structures (for example: small portions of DNA (genes) serve to synthesize specific proteins, proteins for structures making up a cell, tissues are structured based on cells) In parallel to these processes called ascending (from lower complexity to higher complexity, structuration processes) there have been and exist processes called descending (from lower complexity to higher complexity of restructuring). The first type of processes have been called genetic and epigenetic; the second one, is called kinetic by Ortiz (1994), since the activity of the structure of a more complex level remains as a development model of the processes that were its starting point and whose simple structures or elements remain as the active support of the structure of the new complex system, that is, cells make up tissues, but the tissue system already made up determines that the cells remain in a type of organized activity to keep the whole tissue.

The five types of intra-individual information that can exist have been already mentioned. To understand the existence of the extra-individual information and its genesis, it is essential to understand the third consideration of the proposal of the information theory of personality, its basic thesis: The types of information existing in human society are reflected – are coded – in neural networks (connections) in the structure called cerebral neocortex and, thus coded, they turn into psychic information activity of which restructures all types of information a human individual has when born. How society emerges? How the information of society is related to the types of information inside a human individual? Remember that for each level of organization of an individual, the information organized at such level is coded in a memory system.

Ortiz stands out a historical sequence in which there is first a hominization process (processes occurred in hominids leading to the species *Homo sapiens*), a humanization process (processes in members of the species *Homo sapiens* leading to the species *Homo sapiens sapiens* or human species), and finally, a socialization process leading to society as known nowadays.

With the disappear of the ancestral members of the species *Homo*, 30,000 years ago, some groups of human individuals (human psychisms) had a paleocortical cerebral structure with affective and cognitive subjective images (sensation of fear, hungry, thirst, smell, taste, as well as visual, auditory and touch sensations of nature, animals and other human beings as a result of their collective psychic activity).

Thanks to changes in the organization of their brain, they first create the sculpture and drawing, and acquired the capacity of reflecting subjective images “in graphic images that physically exist by themselves on a stone or on another non-living material” (Ortiz, 2010). Said in other words, they create an extra-individual material that will restructure the group of humans, the humanity. This extra-individual information is called social information by Ortiz and it constitutes the base of development for transformation. The consequences happen unexpectedly and determine intra-individual and extra-individual changes.

We should take into account the above-mentioned levels of organization and now let's see how the changes that occurred in the living system billions of years ago, are repeated inside the expectant mother during 9 months. Thus, before the intrauterine inhabitant was born, it was a cell, and then an embryo (that is, tissue individual), then the organs of its body were developed (organic individual or organism) including, of course, the organs of its nervous system and finally, it turned into a fetus in which a type of cerebral cortex was structured in the last three months of pregnancy. The matter of the body of the neonate has, therefore, four types of organization

from lower to higher complexity: The level of organization of all its cells (cellular level), the level of organization of all its tissues (tissue level), the level of organization of all its functioning organs (functional organic level) and level of organization of all the neurons of a type of cerebral cortex (cortical level). We will remember that each one of these levels is organized by a specific type of intra-individual information: Genetic or gene information, intercellular metabolic or biochemical information, neural or nervous impulse information and psychic or cortical information.

When born, almost 90% of the cortex phylogenetically called paleocortex is organized, which allows the newborn to use the receiving cells of its five external senses to transform the surrounding energy -stimuli- in visual, auditory, olfactory neural signs, etc. Signs generated from the energy inside the body are detected by internal receiving cells, so that the baby has sensation of hunger, thirst, pain, etc. Similarly, other paleocortical networks code the psychic information for the executive motor activity, and therefore, the newborn can move the arms, legs and neck, swallow, move the eyes, dilate and contract the pupils, contract the cardiac muscle, etc.

In this moment, there are no networks of other type of the phylogenetically most recent and more complex cerebral cortex yet—the neocortex— that is gray matter with neurons that, of course, already exists when the individual is born but as nervous cells that are not organized yet in neocortical networks organization of which will be by preferential stages during the formation development process.

In childhood, the organization will be mostly determined by a first type of social information to which the child is exposed. Such social information is traditional, that is, information that organizes the affective and emotional aspects of a social group (which gave coherence and solidarity to a tribe in primitive societies). Nowadays, such forms are shown in the happy birthday greetings, the condolences, light blue or pink color of gowns, the

behavior of the fans of two rival teams, close friendships, regional ties, relationship between member of a school class, etc. A notable example of this traditional information is the fact that weak people are protected since they are defenseless: First elderly and children (some of them still include women in such category). In this way, we understand how, for example, the affection and attention the family gives or not to the infant is the social information that is coded very fast as neocortical psychic structures called feelings. Traditional social information has been transformed– according to the information theory - into affective psychic information.

During childhood, the social information of cultural type (for example, knowledge acquired at home, kindergarten and in primary education, television, Internet, videogames) is the one that is coded faster as psychic structures called knowledge, and finally, in the adolescence, the social information of economic type (for example, the necessary information to work and satisfy social needs) is coded as psychic structures called motivations.

Therefore, men are the only living beings who, to form their consciousness, must incorporate the social information organized by the society where the human individual was born and developed.

### **Cerebral Neocortex as System of Consciousness.**

What is difficult to understand about this is not the relationship between society and individual –which is mostly accepted– but the redefinition proposed by Ortiz (2004). In the information theory of personality, consciousness is not realization or the state of being watchful or alert, but all the types of psychic information coded in the cerebral cortex called neocortex. In few words, consciousness is the neocortex and this is material and, like all material, has a structure and an activity.

Each one of the three types of psychic information— affective, cognitive and conative – are structures of the neocortex. They are three systems of memory in each one of the cerebral hemispheres. These memory systems code the three types of psychic information above mentioned in the form of data, that is, in the form of psychic information that is not in use, is “stored”. Neocortical memory systems of the *psychic information stored* are structures called neural networks; thousands of them are each one of the three neocortical components in each cerebral hemisphere (affective, cognitive and conative). They are memory systems of affective representations and emotive procedures, memory systems of cognitive representations and of productive procedures, and finally, memory systems of conative representations (motivational) and of volitive procedures.

Such neocortical networks cover part of each hemisphere, that is, they have an axon that has been defined and delimited by cerebral microscopy, by clinical results of cerebral injuries, and also, by cerebral imagenology.

Data of the psychic information not in use are activated and integrated generating psychic signs during the processes of the neocortical activity that are more extensive cortical neural networks (holocortical) since they cover always both cerebral hemispheres (bihemispheric), either when we perceive (during the acquisition of social information thanks to a memory system of perceptual representations), or when we imagine and think (recovering and preparing psychic information) or when we act (using psychic information). Therefore, in those four processes, four types of memory systems are used: A memory of perceptual representations, a memory of imaginative representations, a memory of conceptual procedures and a memory of practical procedures.

This is the *psychic information in use* and, at any moment of our wakefulness, the processes of the great holocortical, bihemispheric neural networks are organized alternately in one of the three forms of the anticipatory psychic activity: One based mostly on the affective information (and the

component of the personality called temperament), other configuration based mostly on the cognitive information (and the intellect) and the third configuration based on the conative or motivational information (and character). Those forms of organization of the anticipatory psychic activity are anxiety<sup>14</sup>, attention and expectation, respectively.

### **Neocortex Activity transforms the Human Individual in a Social Individual.**

The ITP is a not classical materialist monist proposal that aims, as stated above, to integrate the universe, the living system, the society, the consciousness and the personality in a coherent manner, and it causes great impacts on the neurological and psychological health attention as well as on teaching interventions, but essentially on the construction of the personal moral. This moral is understood as a type of social information of economic origin, with respect to what a society should be as a whole and that, mostly during the adolescence, it is coded as a psychic moral information of conative type (the character).

The concept of mind is relegated to an ambiguous term although its daily and academic use. When proposing a different definition of the structure and of the activity of consciousness, it allows answering the question about the relationship between mind and brain and also, the dilemma about if the brain works as a whole or works in parts: it Works in parts and as whole (in parts, with respect to the psychic information stored; as a whole, with respect to the psychic information in use).

In short, the adult is not a human individual anymore (who when born, it has virtually a psychic activity of adult animal type) but it has been restructured turning into a social individual who has coded feelings, knowledge and motivations throughout its life and it also has structured networks that are sensations and information for the executive motor activity. The psychic information is mostly stored and is activated and integrated when perceiving, imagining, thinking or acting.

Language is a codification system of social information and also of psychic information. It is also proposed that there is a neural support of an intra-individual system called personal speech that is different from the extra-individual system known as language. In the cerebral cortex, there are networks that are developed in children under 3 years and that code the emotion of sounds, knowledge of things and the way the words are placed in a sentence. These data are saved in the networks of the brain system of speech. When one perceives, imagines, thinks or acts, the necessary data are activated and turn into signs: The psychic information stored turns into information in use. By means of this process, the speech system codes the necessary information to be able to read, write or speak.

The group of psychic information stored and the psychic information coded in the neocortex is what is called in ITP consciousness. Personality is the set of all levels of organization (from the least complex level, that is, cellular level to the most complex, that is psychic level).

## **Conclusions**

The approach on the problem of the relationship between mind and brain firstly lies in giving the due importance to the understanding of the human being's nature and of the continuous interrelation of the social information with the psychic information throughout its life. It is considered that the mind has never been described in a scientific manner and that everybody talks about it as if there were an intersubjective agreement. This is resolved by locating the constitutive elements of daily, psychological, philosophical and cybernetic conceptions about mind. Once it is carried out, it is explained within a theoretical framework that explains the determination of each one of the "mental" functions, structures or activities from its structuration from the most complex levels to the most complex levels of the living system called human individual. Besides, in a reverse manner, the restructuration from the most complex existing living system: Society, its way of codification in language and the types of information that organize it and it is reflected in the intra-individual levels of the social individual called personality.

A social psychobiological conception of the nervous, brain and cerebral cortex system is also proposed. It is not limited to the explanation about the anatomy of the corpse and the chemical or electrical processes but they are integrated in the double aspect of the psychic information such as psychic representations (structural aspect) or as psychic procedures (temporary aspect) that are reflected in the objective independent personal action of temperament, intellect and character.

This approach, to the best of our knowledge, is more complete provided that it is not limited to certain aspects (perception, attention, knowledge, feeling) but it integrates the visions on consciousness, society and universe.

The information theory is aimed at the structuration of an affective, cognitive and conative consciousness from birth to generate respectable, autonomous and honest personalities. The applications to education, diagnosis and health assistance based on the Social Neuroscience will be studied in another article.

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