Neuromantics

A theory on a different pattern of neural communication

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Introduction

The study of the brain is considered to be one of the last frontiers of the biological sciences. An immense body of contemporary work and its consistent and profound results makes almost unbelievable today the fact that not 300 years ago the brain was a complete mystery, even more so as far as its function was concerned. Although its existence as an organ was known since antiquity, no real function was attributed to it until Descartes in the beginning of the 17th century. He localized the „soul” inside the brain, more specifically in one of its parts, the pineal gland *(Marshall and Magoun, 1998)*. Before this interesting concept, although completely erroneous, a more important functional significance was attributed to the cerebrospinal fluid inside the ventricles than to the brain itself.

It was a long scientific way from René Descartes' theory to the present neuroscience. Much is known today about the anatomy, physiology, and pathology of the brain. However, its function in all its perceived manifestations is still in a large measure a matter of discovery and, in spite of significant progress in the recent decades, the way it produces its computations in such enormous data processing streams and with such efficiency on so many levels remains largely unexplained.

The Question

Many questions about the brain still await their answers, however one of the most intriguing is: *do brains communicate in a way other than the known senses*? A consistent volume of recorded phenomena would suggest that there is a more subtle pathway of interaction between the brain and the environment and between the brains themselves.

We propose an alternate pathway of neural interaction and analyze its explanatory capacity in the case of documented phenomena. In order to define our concept we have to go back to a few known facts about the brain and look at them from a slightly different perspective. For the sake of subsequent arguments we will interpolate the necessary collateral data where we see the best correlation to the biological reality.

Prerequisites

The average number of neurons in the human brain is approximately 100 billion, of which the neurons in the neocortex range from 19.3 billion in females to 22.8 billion in males. This number of cells generate and sustain a network of an estimated 0.15 quadrillion synapses, i.e. 150,000 billion synapses *(6,7)*. For the purpose of this paper more relevant still is the summed length of myelinated nerve fibers in human brain that reaches approximately 150,000 to 180,000 km *(6,7)*. These myelinated fibers can be abstracted to cables as illustrated classically by Kelvin's theory applied to neurons by Hodgkin and Rushton. According to this theory the neuron is treated as an electrically active, perfectly cylindrical transmission cable.

With a resting potential of around -60 to -70 mV, the action potential rises to around 100 mV, depending on the type of neuron and species.

A direct physical consequence should be the generation of a magnetic field of certain intensity, thing that occurs and forms the basic principle behind magnetoencephalography. As the name readily explains, MEG is a technique for mapping brain activity by recording magnetic fields produced by electrical currents occurring naturally in the brain, using very sensitive magnetometers. A continuously developing technique since its introduction in 1969 by Cohen, MEG is the most convincing hard evidence of the electromagnetic activity of the brain and of its intrinsic informational content. Contemporary results suggest that MEG is the best tool to localize brain functions, despite its technical difficulties. Important for the argument of our paper is the fact that synchronous neural activity as that of alpha and beta brain rhythms generates a magnetic field of three orders of magnitude larger than the resting brain (10^3 fT compared to 10 fT).

At this point is useful to introduce a few notions from classical electrodynamics that we see relevant for the understanding of the physics behind our theory: induction (Fig. 1), inductance (Fig. 2), and its two variants, self-inductance and mutual-inductance. Revealed by the classical experiments of Oersted (1824) and Faraday and Henry (1831) the process of generating electrical current in a conductor by placing it in a changing magnetic field is called electromagnetic induction or, simply, induction. It is called as such because the current is said to be induced in the conductor by the magnetic field and it is measured in Henries (H). When this phenomenon occurs in an electrical circuit and affects the flow of electricity it is cold inductance. Self-inductance is the property of a circuit whereby a change in current causes a change in voltage in the same circuit. If one circuit induces current flow in a second, nearby circuit, than we speak of mutual-inductance.

A number of characteristics make the set of neurons in the brain suitable for an approach in terms of quantum mechanics. Margenau has made the first and the most compelling case for the brain as a possible field of application for the physics of quantum mechanics. In his words: "*In very complicated physical systems such as the brain, the neurons and sense organs, whose constituents are small enough to be governed by probabilistic quantum laws, the physical organ is always poised for a multitude of possible changes, each with a definite probability;...*" (4). For our purpose, we retain only one principle from the quantum mechanics, well aware of the theoretical rigors. Probably one of the most important consequences of quantum mechanics is the phenomenon of "entanglement." Given two quantum particles that are interacting properly, their states will be correlated, no matter how far apart they are. For example, a particle can be in Bucharest and another particle in Berlin. If we measure them simultaneously the measurement of the particle in Bucharest will absolutely and unequivocally determine the outcome of the measurement in Berlin. The same holds true for the other way around.

Hypothesis

Our theory proposes that one brain, more specifically particular populations of neurons, communicate directly by means of electromagnetism making possible a significant influence on “pre-paired” population of neurons in another host with little regard of distance. The particular current flow in the given population generates an electromagnetic field that produces minute alterations in the electromagnetic spectrum, yet highly tuned in frequency, enough to generate a significant functional change in another population that responds to that particular frequency.

One of the questions that rises imperatively is the “place of action” for the suggested functional hypothesis. Previous authors have proposed the dendron *(the dendritic bundle is a microunit of structure of the cerebral cortex, Peters and Kara, 1987)*. Eccles (1989) proposed that this is also the cortical structure of the microneural events interacting with unitary mental events. We advance the idea that any group of neurons working together at encoding a relevant unit of information is a generator of electromagnetic pattern, as well as a “ready” receptor in the sense that the “correct” change in the electromagnetic pattern will see this particular group of neurons more likely to “respond” with an appropriate computation.

Discussion

This process could generate two possible outcomes depending on the magnitude and the tuning of the networks. The first outcome, given enough power and correct tuning, is the generation in the receiver of a response similar to that of the transmitter. For example the feeling of fear could be felt by an observer close to a witness to a fear-generating event (in the absence of other sensorial clues like visual hints, auditory signals or others). The second possible outcome, in our view, in the instance of a weaker transmission, is that of a small yet significant change in the receiving network is enough to place this network in a ready-state, at unconscious level. In this instance, a second encounter with the same electromagnetic pattern would generate a conscious “perception”. This could be the case of the “déjà vu” states of things definitely not in the history of sensory perceptions of the receiver.

The *transmitter* is the source of the neural pattern while the *receiver* is the direct responder. The *carrier* is mostly in the ready-state and transport the informations on long distances (Fig 3). A former receiver could remain under certain circumstances a permanent carrier. A carrier, on the other hand, will respond stronger and more often at weaker transmitters, so more often than a non-sensitized network.

In our view this kind of interactive process is more likely to happen at the level of the “primitive” brain, i.e. arhi- and paleocortex (Fig. 4). The reasons behind our assumption lay in the documented processes at this level. Current data suggest that neurons in these structures process and respond to simple stimuli. Secondly, these areas benefit from short interconnecting pathway and have the means of reaching the conscious, complex processing of the cerebral hemispheres. As a consequence, in our view, these areas are a very pertinent place of action for the electromagnetic communication.

Let us look at an example which we believe that helps clarifying the type of interaction and communication that we advocate. Consider a very powerful tune, a rhythm or a memorable short melody, like Beethoven's first four notes in the beginning of his fifth symphony. Even without prior conscious exposure it seems extremely familiar. Even more it is distinguishable as an entity even in a very complex auditory context. The phenomenon goes even further and, the first time one hears it, it seems "right". It cannot be any other way. This happens in an "obvious" and very familiar spectrum, the audible space. It is the kind of phenomenon that we believe it replicates with a different order of magnitude and on a different space at the electromagnetic/neural level.

An appropriate electromagnetic pattern, generated by a certain network of neurons is capable to produce minute, yet decisive events (in terms of altering the existing computation paradigm) in a different host. As consequence the receiver will experience conscious perceptions ranging from "unexplained' feelings, through "déjà vu", "déjà-vécu" sensations, all the way to actual sensory perception like that in telepathy. The degree of "purity" of the transmitter, the tuning of the two networks, and the sensitivity of the receiver will ultimately decide the quality and the quantity of the electromagnetic neural effect.

To help clarify the things even further, consider another consequence of our theory, this time at a population level. As a result of different electromagnetic impressions on transmitters' and carriers' microcircuits, the mass of individuals constitutes a universal storage device. From a certain angle is similar to a global hard drive that holds bits of information in raid. As a result a huge amount of information is virtualized in storage and is retrieved under specific circumstances. Even more, as a bit of information becomes more relevant for a larger number of individuals its representation on the universal hard drive is stronger and its retrieval and influence on regular communication becomes more emphasized.

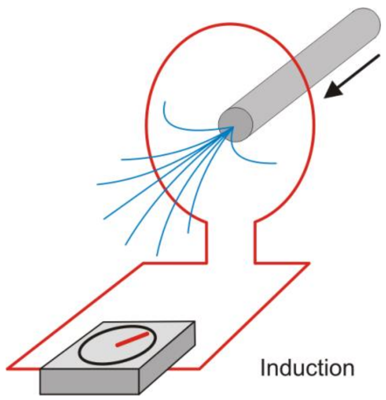

Fig. 1

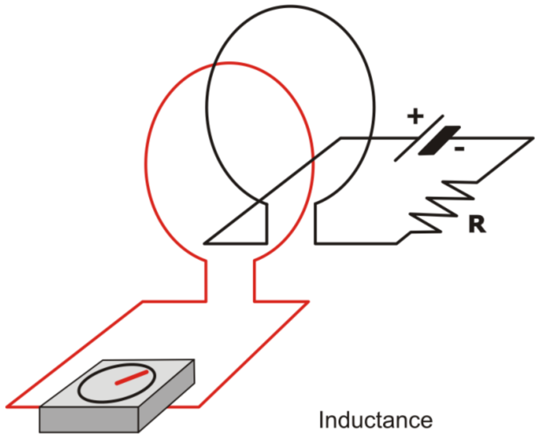

Fig. 2

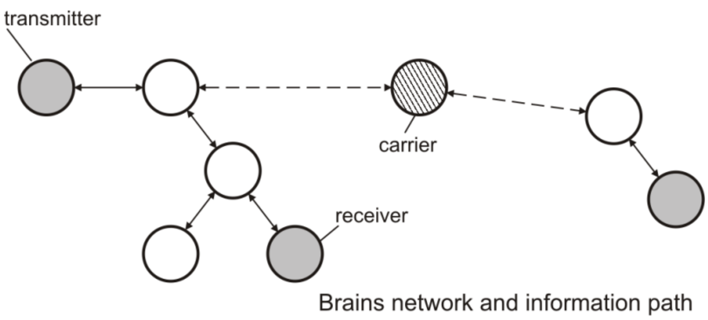

Fig. 3

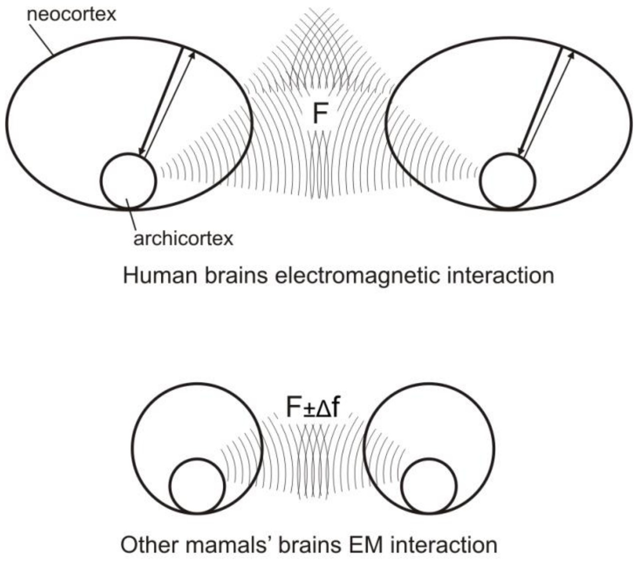

Fig. 4

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Figure captions

Fig. 1 - Schematical representation of induction.
Fig. 2 - Schematical representation of inductance.
Fig. 3 - Representation of population relationships in terms of electromagnetic communication, depicting the transmitter, carrier, and receiver.
Fig. 4 - Graphical representation of the electromagnetic interactions between human brains (upper image) and between other species' brains (lower image) with a different electromagnetic frequency (Δf takes highly specific values for a certain species).