REALIZING THE CONSCIOUSNESS IN ARTIFICIAL INTELLIGENCE

German J.O.[1], German O.V.[2]

[1]Electronic computing machines department, The Belarusian State university of informatics and radio-electronics

[2]Information technologies in automatized systems department, The Belarusian State university of informatics and radio-electronics

Minsk, Republic of Belarus

E-mail: juliagerman@gmail.com

A new two-unit model of a «conscious» neuron is presented to be realized in AI-based systems. The main difference from the known paradigms is the admission of the phenomenon of self-perception by the neuron of its own state, displayed by its electromagnetic cloud. This phenomenon creates in given representation the nature of consciousness. Some consequences of the hypothesis are considered.

INTRODUCTION

Human consciousness is not accessible from outside. That is why any stated consciousness model cannot be accepted as completely proven. There are different conceptions regarding phenomenon of consciousness. From these conceptions, one of deserving interest is that, considering consciousness not as a physical process with definite characteristics, but rather as a state (property) of neuron(s). This conception is known as an equality of mental (psychical) and physical processes in the brain [1]. In some models consciousness is associated with electromagnetic field generated by neurons, for instance, as accepted in [2,3]. In [4] consciousness is associated with virtual reality, however, the nature of such a reality remains unclear. Probably, the most interesting is conception by F. Crick and K. Koch [5]. They suggested that there is a special area in brain called claustrum which is represented by small (maybe, only one) big neuron(s) connected by a tremendous amount of synapses to other neurons. The claustrum plays role of a center to see the information code transported through the synapses. This conception is taken here as basic. We develop it to get some another model with practical orientation to artificial intelligence.

I. BASIC SCHEME

The only task, solved by consciousness, consists in seeing the information code directed from the other neurons. It is no matter what this information code represents – pain, tactile feeling, speech or other. Claustrum «sees» this code, enabling human to represent what is going on. Literally, claustrum sees electromagnetic cloud around it and containing information data. Claustrum also sees its own state what is most important as this assumption leads to understanding of the nature of «Selfness». The state of claustrum is represented by its own electromagnetic field which is superposed with external electromagnetic cloud with information code delivered through synapses from outside. The nature of this phenomenon may be explained in the following way: «to see electromagnetic field» means to «change internal state of claustrum in order to generate the same electromagnetic field from inside». This is in accordance with the conception of equality of mental (psychical) and physical processes in the brain [1]. The state of the claustrum is the same as external electro-magnetic field with information data. To be more exact, we admit that the resulting electromagnetic field ER is a superposition:

$$ER = E1 + E2 \qquad (1)$$

where E1 is external field with information data and E2 stands for some constant internally generated electromagnetic field of claustrum. By this, we admit that claustrum can see its own state. Once again, the claustrum state is equivalent of the electromagnetic-field around it. This field can be changed by means of bio-currents directed from outside to claustrum and carrying information data, and from inside (from claustrum body itself).

II. MATHEMATICAL REPRESENTATION OF THE ELECTROMAGNETIC SUPERPOSITION

Our aim is to show the possibility to model consciousness in computer. It is necessary to bear in mind that electromagnetic field around claustrum contains different signals. Some signal delivers pain sensation, the other signal carries the hearing sensation etc. To mathematically describe this sum of signals, one can use Fourier transformation as it enables to simply realize representation of the sum (superposition) of signals. The only task, solved by consciousness, consists in seeing the information code directed from other neurons. It is no matter what this information stands for. Consciousness simply «sees», not analyses the information data. To «see» information means (as we accepted) to generate electromagnetic field in

the form (1). The neurons, providing information to claustrum, work in different way, as their task is «to analyze» not «to visualize» data. By this feature all living creatures differ from one another. To model consciousness with electronic scheme, one needs: (1) to realize a computer «answer» to accepted information code (input electromagnetic field containing information data). The answer is the same field, produced (as could be supposed) on resonance basis. Essentially, that consciousness modeling unit should re-build its internal process accordingly to input signal. (2) To keep the generated field around the consciousness modeling unit till new input data arrives. From (1) one can conclude that essential part of the consciousness modeling unit process is that one, representing electromagnetic oscillations, reproducing the information signals in the input field. The next serious problem is to model attention (that is, the ability to concentrate on a definite part of the image). This problem concerns formal way of estimating the weights of information contents. In living creatures, the priorities are connected to the life values of external factors. In AI-based robotic objects the situation is different and depends on the goals of the objects themselves. What are these goals? For instance, these may be providing comfortable conditions for the human personal in the hospitals or observing passengers in airport halls to discover suspicious men. So, AI-based consciousness is strongly oriented at the goals of its carriers. From mathematical viewpoint, mechanism of attention may be realized as a multi-criteria decision maker (we leave discussion of that point).

III. The main problems of AI-consciousness

As was said above, the only task, solved by consciousness, consists in seeing the information code directed from other neurons. It is no matter what this information is. There are two big problems arising when implementing AI-consciousness. First, consciousness is realized by biological entities, not electronic ones. By this we assert, that seeing of its own state as it is realized in neurons may be impossible in electronic bodies. Yes, one can generate electromagnetic field representing the state of the electronic entity but it does not mean the entity sees itself. Second, the information displayed in consciousness, is perceived as ordered in time and space. This again maybe unachievable in electronic device, where an information image is represented as a data mess (to tell figuratively). This two problems seem to be crucial from the current positions. However, some acceptable solutions could be found.

IV. Conclusion

The evolutionary doctrine leads to the conclusion that the "conscious"neuron, apparently, "started"with the recognition (perception) of its own electromagnetic radiation. An analogy is quite appropriate, according to which the own electromagnetic field of a neuron is its "soul", the perceived electromagnetic background, evidence of "cash". This own electromagnetic radiation, even if in the form of "information noise is the primal form of self-perception. In the course of evolution, other ("non-conscious") neurons began to produce more complex information codes, for example, transmitting pain. In principle, our point of view conveys the identity of the "viewer"and the "screen with the image since the opposite assumption leads to a reduction to infinity. The essence of the position is that the screen is the state of the viewer, it is the property of the "conscious"neuron - the property of "seeing"the electromagnetic field. This position is not at all a statement of the mind and brain identity. Its physical nature is unclear. Despite the impossibility to reproduce the feeling of Selfness in electronic device, the possibility to use AI-based consciousness is very attractive and exciting.

The most reasonable application of AI-based consciousness is its usage in interaction with real man. That is, man stands in position to understand what is going on in electronic brain. This is especially important if the external environment is dangerous for human presence due to some obstacles or other reasons. The other idea consists in interaction with AI-based intelligence, that is to change its electromagnetic field in the required way. This opportunity enables man to suggest his/her own ideas to electronic brains.

V. References

1. Polger, T.W.Identity theories / T. W. Polger// Int. J. Philosophy compass, No. 4, 2009, p.p.1–13.
2. Dean, S. Brain and consciousness. How brain encodes thoughts / S. Dean, Career Press.2018 440p.
3. McFadden, J. The conscious electromagnetic field. The hard problem made easy? /J. McFadden. Journal of Consciousness Studies, 9, No. 8, 2002, pp. 45–60.
4. Dubrowsky, D. I. The problem of consciousness and a brain. Theoretical solution. /D. I. Dubrowsky. Moscow. Canon, 2015, pp. 208p.
5. 7. Crick, F.. What is the function of the claustrum? / F. Crick, C. Koch. Philosophical Transactions. Royal Society. 2005. Vol. 360. –pp. 1271–1279.