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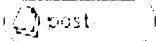
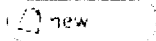
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The proemial synapse and consciousness generation

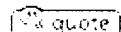
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Author

Message

Bernhard Mitterauer

Posted: Fri Jul 18, 2008 7:06 am Post subject: The proemial synapse and consciousness generation



Joined: 07 Jun 2005
 Posts: 17

The proemial synapse. Consciousness generating glial-neuronal units**Bernhard J. Mitterauer**

Since the publication of the "Astrocentric Hypothesis" by Robertson in 2002, increasing experimental evidence is supporting this approach to consciousness. However, from a theoretical point of view the problem which formalism may be underlying glial-neuronal interactions capable of embodying an elementary consciousness generating mechanism is still unsolved. Let me shortly report on my recent pertinent investigation (Mitterauer, 2008).

Guenther (1976) introduced into formal logic a novel type of relationship called "proemial relationship" (Greek: proomion= mirroring). The formal structure of a proemial relation presumes that a system consists of two components that can function both as a relator and a relatum. The crucial point is that if we let the relator assume the place of a relatum, the exchange is not mutual. The relator may become the relatum, but not in the relation from which it formerly established the relationship, but only in a relationship of higher order and vice versa (for detailed formal description, see Mitterauer, 2008 and Kaehr, 1978).

My hypothesis is that the interactions in glial-neuronal synapses are based on proemial relationships in the sense of elementary consciousness-generating mechanisms.

According to the glial-neuronal synaptic model of Newman (2005), the information processing between the four components of the synapse may be basically this: neurotransmitters (NT) released from the presynaptic neuron occupy glial receptors, embodying an ordered relation. In parallel, NT released from the presynaptic neurons occupy postsynaptic receptors and are reuptaken in the presynaptic neuron, designated as an exchange relation. Already activated by NT, glia release gliotransmitters (GT) that occupy receptors on the presynaptic neuron, turning off neurotransmission temporarily in the sense of an ordered relation. In addition, a glial intercellular signalling through gap junctions mediated by GT represents an exchange relation between glial cells. (For biological details, see Newman, 2005).

Taking a closer look at the types of relations, we can see two exchange and ordered relations each. The relational interplay of these four relations generates a proemial relationship, but of a special kind called cyclic proemial relationship (Kaehr, 1978).

This type of relation may be an inevitable prerequisite for any theory of consciousness. Its formal description is as follows:

Glia (G) dominate the neuronal components (N) by modifying them. Therefore, G play the role of a relator and N is the relatum. If this relationship changes inversely, N becomes the relator and G the relatum. Since the proemial relationship is cyclically organized, glial-neuronal synapses are capable of changing their relational positions in the sense of an iterative self-reflection mechanism. Hence, it seems to be legitimate to speak of proemial synapses.

Admittedly, this model of a proemial synapse is experimentally not testable in the tissue of biological brains. Therefore, robotics may represent an alternative approach. According to McCulloch (1965), one of the founders of cybernetics, brain research of "mind phenomena" must be based on the principle of feasibility. Thus, if we are capable to formally describe brain functions it may be possible to implement these into a technical mechanism.

The model of a proemial synapse could represent a step in this direction.

Paraphrasing "Artificial Ingenuity", such a robot brain would embody an "ingenious device".

P.S. Illustrative figures can be requested from the author

References:

Guenther, G. (1976). Cognition and volition. A contribution to a theory of subjectivity.

In: B. Kanitscheider (ed.). Sprache und Erkenntnis. Alma Mater Oenipontana, Innsbruck, pp. 235-242.

Kaehr, R. (1978). Materialien zur Formalisierung der dialektischen Logik und der Morphogrammatik. In: G. Guenther, Idee und Grundriss einer nicht-Aristotelischen Logik. Meiner, Hamburg, pp. 1-117.

McCulloch, W.S. (1965). Embodiments of mind. MIT Press, Cambridge.

Mitterauer, B. (2008). Intersubjective communication in the synapses of the brain. Grundlagenstudien aus Kybernetik und Geisteswissenschaft 49: 84-90.

Newman, E. (2005). Glia and synaptic transmission. In: H. Kettenmann, B. Ransom (eds.), Neuroglia, University Press, Oxford, pp. 355-366.

Robertson, J.M. (2002). The Astrocentric Hypothesis: proposed role of astrocytes in consciousness and memory formation. J. Physiol. (Paris) 96: 251-255.

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James Robertson

Posted: Fri Jul 18, 2008 4:21 pm Post subject: Eccles "Dendron" and "Psychon" and the P [Quote](#)

Joined: 18 Feb 2004
Posts: 74

Very interesting point of philosophical formalism and its relation to artificial intelligence. The proemial synapse brings to mind the great John Eccles (1986) search to explain consciousness and memory formation.

He proposed a binomial model in which neuronal activity in Lamina 1 of the cerebral cortex was the site of both functions because it is the area where top-down and bottom-up information processing converge. In other words, it is the area where sensory information ends and motor responses begin. It is also the major area where cortico-cortical association processes terminate (Cauller 1995). These are believed to contain detailed highly processed information necessary for higher functions, such as memory and consciousness.

Eccles termed the known neurophysiological empirical data of the time as composing the "dendron". However, he was forced to propose another theoretical

entity, the "psychon", to complete his attempt to explain consciousness and memory formation. Quantal neuronal responses did not allow a "bridge" between neuronal activity and the "mind". This led Eccles to become a dualist.

I previously proposed (Robertson 2001) that astrocytic information processing, unknown before Eccles death, constitutes the "psychon". This is in agreement with the proemial synapse, if I understand the proposal correctly. Lamina 1 consist of astrocytes and a complex synaptic neuropil with very few nerve cells. The glia limitans, an extensive layer of astrocytes, overlays this lamina as well.

Patricia Churchland (1986) proposed a "Neurophilosophy" in an attempt to unify scientific-based philosophy with concepts of the "mind/brain". Dr. Mitterauer seems to be in a position to form a new branch of philosophy - Gliophilosophy.

References Cited:

Cauler, L. (1995) Layer 1 of primary sensory neocortex: where top-down converges on bottom-up. *Behav. Brain Res.*, 71(1-2): 163-170.

Churchland, P.S. (1989) "Neurophilosophy: Toward a Unified Science of the Mind-Brain". MIT Press. Boston.

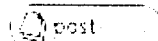
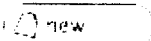
Eccles, J. C. (1986) Mechanisms of long-term memory. *J. Physiol. (Paris)*, 81(4): 312-317.

Robertson, J. M. (2001) A Unifying Theory of Consciousness: The Astrocentric Hypothesis. Unpublished Monogram. Copyright 2001.

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