A Biosemiotic Analysis of Serotonin's Complex Functionality

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Part of the adaptation capability and evolution of living systems includes the importance of individual history and of the relevant phenomena that condition the behaviour of cells and organisms. Such complex processes and their relevant properties lead to the development of complex memory structures which are informed so as to prepare the organism for a future confrontation with the same or similar stimulus.

Serotonin (5-HT) is one key neurotransmitter which engages in such complex self-organising processes and it functions both in the nervous and in the immune system. Specifically, the presynaptic cell releases serotonin through secretion and it is then reabsorbed by the postsynaptic cell through a specific 5-HT receptor by activation of adenyl cyclase activity. This production is regulated by a negative feedback of the serotonin on the presynaptic cell release activity. Similarly, the 'immune synapse' is the context in which the interaction between serotonin and dendritic cells occurs in immune response. Dendritic cells are maturated by sequestration and thereafter secretion of serotonin, which then in its turn informs naive T-lymphocytes to proliferate into activated T memory cells.

So far, due to a purely mechanistic treatment of the respective functionality, the informative capacity of serotonin has not been verified and the respective consequences cannot be identified. The central question is "Whether *serotonin is a mediator"*.

To better understand this complex functionality and to identify the main agents involved as well as the representational processes that these agents are engaged in, a biosemiotic analysis of serotonin's interactions is attempted. Specifically, the recent work of (Queiroz and El-Hani, in press) regarding the emergence of semiosis in complex semiotic systems will be used in order to develop a semiotic analysis of the mechanisms and the functionality arising in aspects of adaptation and sensitivity regarding the formation of T-cell memory and the serotonin neuronal feedback mechanisms. We believe that such an analysis would provide us with better insights regarding inquiries such as whether there is specific information in T-cells through serotonin and could these meaning processes be influenced by specific serially diluted and agitated (SDA) forms of substances (such as used in homeopathic medicines) and on which property (degree of specificity or magnitude) does the effect of recognition and interpretation of the biological signal depend on.

Keywords: Serotonin, Information, Representational processes, Peircean semiotics, Self-organisation.

References

João Queiroz and Charbel Niño El-Hani: Semiosis as an emergent process. *Transactions of the Charles S. Peirce Society: A Quarterly Journal in American Philosophy* (in press).