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On the interpretation of the recent nobel prize discovery of the "internal GPS" in the brain and its possible implications for medical treatment

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On the interpretation of the recent Nobel Prize discovery of the "internal GPS" in the brain and its possible implications for medical treatment John O'Keefe with May-Britt Moser and Edvard I. Moser have discovered a surprising phenomenon of the internal memory map in mice brains. It has been observed that some neurons fire when the tested animal moves over a particular area. In this work, we provide an interpretation of this effect based on a model of the brain suggested by S. Berkovich. For this purpose, we have arranged computer simulations of random walks of an artificial "mouse" with rate of recording determined by the time "mouse" spends in a given position. Then, some cutoff threshold was chosen, and according to the considered brain model the signal can be detected only above a certain threshold. The simulation outcomes resemble the obtained experimental results. The correctness of our concept can be verified by studying memory maps from various special forced deterministic movements of a real mouse. As long as the discovered phenomenon is real, it can provide a new approach to medical treatment. Apparently, macromolecule interactions are essentially determined by information signaling rather than merely by direct physical contact. So, medical drugs can be applied from outside using internal memory map of a pathological area of the organism. Most remarkably, the possibility of localized outside applications of drugs may reduce undesirable side effects, especially some detrimental consequences of chemotherapy in cancer.

Biography

Chen Shen received a BS degree in Software Engineering from Huazhong University, China, 2011. In the Spring of 2013, he got. an MS degree in Computer Science from the George Washington University. He made a master thesis on "Generalized Fibonacci Code" under guidance of Professor Berkovich. In the fall of 2013, he joined a startup company as an image processing engineer in Tennessee. At the same time, he did research on Big Data with Professor Berkovich and his student. Now, he is a Ph.D. student of the GWU CS Department doing research under the advice of Professor Choi.

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