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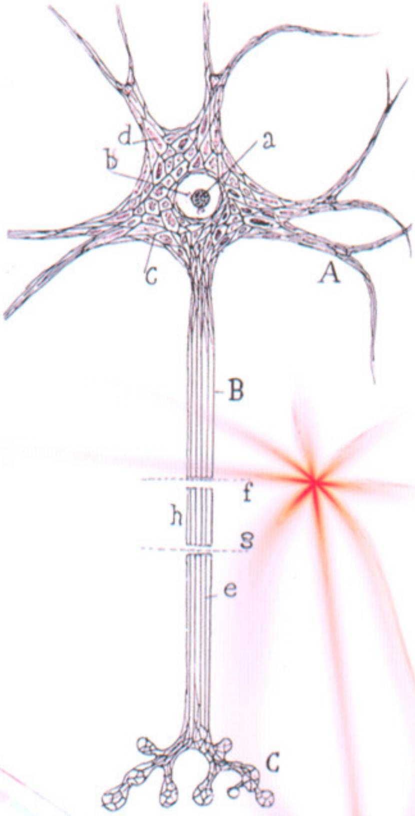

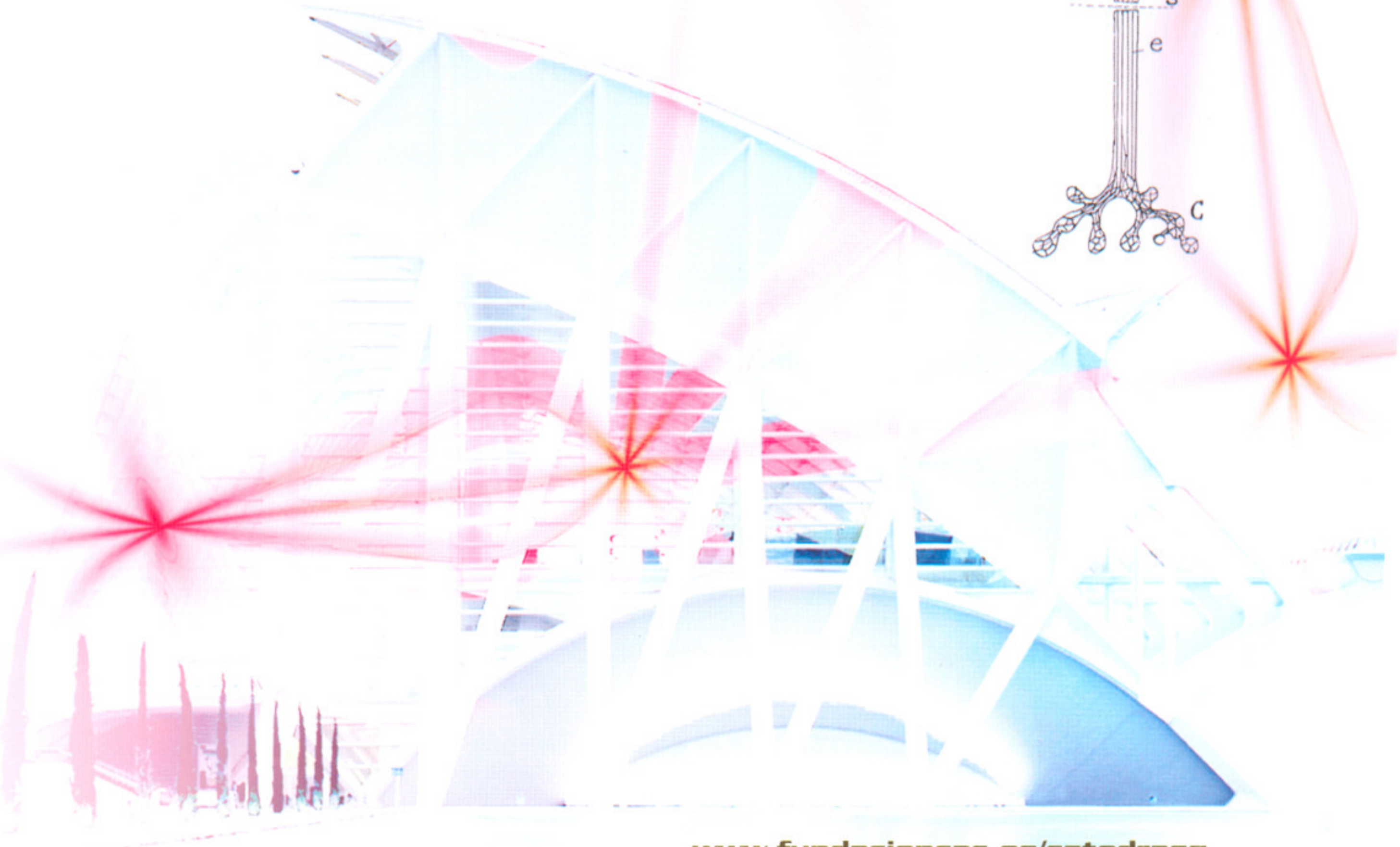

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ABSTRACT Nº 19

THE FIRING FIELDS OF SUBICULAR PLACE CELLS ARE MODULATED BY THE SPATIAL STRUCTURE

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Previous studies on subicular place cells (SPC) have shown that these neurons could generate similar spatial representations across different arena shapes and sizes, possibly by using arena boundaries to set their firing (Sharp, *Behav Neurosci*. 1999, 113:643; Sharp, *Behav Brain Res*. 1997;85:71). Similarly, a model developed to explain hippocampal PC firing proposes that PC could be modulated by boundary vector cells (BVC), neurons set to fire at a certain distance and angle bearing to the arena boundaries, behaving in a similar way as subicular PC (Barry et al, Rev Neurosci. 2006;17:71). To determine the relevance of physical boundaries on spatial coding, neurons were recorded from the subiculum of chronically implanted rats in and their firing fields mapped while foraging for food in an open field; barriers were then inserted, generating four similar sub-chambers. Of 65 recorded units 92 % replicated their firing fields in the large arenaat least in 2 chambers, while 5% displayed plasticity across all 4 rooms and 3% stopped firing in the 4-room arena. Results suggest that SPC can adapt their firing from the initial recording to the new generated spatial context and that barrier insertion generates similar firing structure in the different and similar sub-chambers. Units behave in a very elastic fashion replicating firing field structure across different environments and arenas. Thus, the subiculum could be mainly coding for geometry and size of the spatial context, behaving similarly to the BVC proposed for hippocampal neurons.

ABSTRACT Nº 18

WHERE IS THE RAT? PREDICTION OF LOCATION BY PLACE CELLS´ FIRING

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Hippocampal place cells in rats fire when the animal visits a specific location. In a total of 6 rats 1 to 4 tetrodes were chronically implanted in order to measure spike acitivity of single neurons. Additionally, the running path of the animals was investigated with a video tracking system. Both the spike activity and the tracking information were used to train different algorithms to find a relationship between the neural activity and the xy position of the rat. Three position reconstruction algorithms (Zhang et al. J Neurophys 79: 1017, 1998) have been implemented and were applied to the data: (i)Template matching, (ii)Probabilistic / Bayesian method (1-step), (iii) Probabilistic / Bayesian method with continuity constraint (2-step). In a second step the position of the animal in xy-coordinates was reconstructed just by investigating the spike actitity. This paper shows that the position can be predicted with a deviation of only 10 cm in an area of 1 m by 1 m just by single cell activity in the best case. Reconstruction accuracy gradually increases with the number of place cells. Recordings from hippocampal CA1 regions yield better reconstruction accuracy than recordings from subicular units.