The role of hippocampus in goal and goal value coding

Résumé du projet de recherche (Langue 1)

At the interface between spatial cognition and decision-making, this project aims at unravelling the role of the hippocampus in spatial goal coding and goal value coding. The hippocampus is a brain structure that has been shown to be involved in episodic memory and spatial cognition. In particular, hippocampal cells show an activity which is highly correlated to a subject's position in a given environment (O'Keefe and Dostrovsky, 1971). At the population level, these cells are likely to be the support for a "cognitive map", a representation used to store, organise, and recall information about elements of the environment and the interactions between them (O'Keefe and Nadel, 1978). If such a representation is used for the planning of actions in goal-oriented behaviours, it should contain information about the location of the goals and their respective value. But whether hippocampal cells' activity is influenced by the existence of spatial goals is still a matter of debate and seems to depend on the experimental paradigm used. Also, the rare studies in which quantitative aspects of the goal were modified (e.g., associated reward amount) provided controversial results (e.g., Lee et al., 2012; Tabuchi et al., 2003). As an attempt to clarify the issue of goal and goal value coding in the hippocampus, we will use in vivo electrophysiological recordings in the rat during a goal-oriented spatial task. A first step will be to develop a task compatible with such recordings where aspects of a goal can be altered, such as its location or its value. Moreover, the task should be easily adaptable to a modelling approach, which could eventually be used to get answers from a more theoretical point of view. Once a proper paradigm is chosen, electrophysiological recordings of hippocampal cells will be performed in different reward conditions. This part of the project will be completed in the Laboratory of Cognitive Neuroscience, in Marseille, under the supervision of Dr. Etienne Save. After the data collection phase, a series of analyses will be performed to address the question of goal and goal value encoding by hippocampal cells. This part of the project will be mainly carried out at the Institute of Vision (in Paris), in the Aging in Vision and Action group, under the supervision of Dr. Angelo Arleo.

Résumé du projet de recherche (Langue 2)