Modeling the neural basis of spatial orientation in humans to study age-related impairments in spatial navigation

Résumé du projet de recherche (Langue 1)

Healthy aging affects neurophysiological, perceptual, and executive functioning. Although it is clear that aging influences both low-level and cognitive vision-dependent processes, the link between these aspects of aging remains poorly understood. This doctoral work is part of a larger project carried out at the host laboratory of Aging in Vision and Action (led by A. Arleo) at the Institute of Vision, Paris. The laboratory combines experimental psychophysics and neurcomputational models to cross-link behavioral and neuronal functional alterations occurring with natural aging. This project aims at building a biologically plausible model of spatial cognition in humans. The model will incorporate existing knowledge on the neural basis of episodic and procedural spatial learning in humans (e.g., brain imaging and psychophysical data) and animals (e.g., electrophysiological and behavioral data). The model will primarily account for hippocampal place coding mechanisms (mediated by place, grid, and head direction cells), mimicking a learning process capable of integrating visual and self-motion sensory inputs. In a second step, the model will account for the neurobiological knowledge on age-related impact on neural coding and adaptation mechanisms mediating spatial learning. The ultimate goal is indeed to use the model to study how natural aging shapes the action-perception loop during spatial navigation in the elderly.