

## MRT- INFLUENCE OF SENSORY MODULATIONS ON VIRTUAL SPATIAL NAVIGATION AND MEMORY – COGNITIVE PROCESSES INVOLVED

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Navigating in a familiar or unfamiliar environment is a frequent challenge for people. Many patients with brain injury suffer from topographical difficulties, which influence their autonomy in daily life. Virtual Reality Tools enable the evaluation of large scale spatial navigation and spatial memory, resembling a real environment, adding possible stimuli for enhanced support. These stimuli can be contextual, and either linked to the task that participants have to accomplish in the Virtual Environment, or non-contextual, i.e. with no link with the require task.

This thesis explores whether visual or auditory stimuli influence spatial navigation and memory in Virtual Environments of patients with brain injury or with a neurodegenerative disease. The first part of the thesis shows that contextual auditory stimuli like a sonar effect or sounding the names of products on the shopping list improved spatial navigation of brain-injured patients during a shopping task in the virtual supermarket VAP-S.

The second part of this thesis highlights that non-contextual auditory stimuli with a high perceptual or cognitive salience decreased spatial navigation performance of brain-injured patients during a shopping task in the VAP-S.

The third part of this thesis showed that visual cues like directional arrows and salient landmarks improved spatial navigation and some aspects of spatial memory of patients with Alzheimer's disease or Mild Cognitive Impairments during a navigation task in a virtual district.

The last part of this thesis demonstrated that auditory cues, i.e. beeping sounds indicating the directions, increased spatial navigation in a virtual district of patients who have had a stroke with contra-lesional visual and auditory neglect.

These results suggest that some visual and auditory stimuli could be helpful for spatial navigation and memory tasks in patients with brain injury of neuro-degenerative disease. It further offers new research avenues for neuro-rehabilitation, such as the use of augmented reality in real-life settings to support the navigational capabilities of these patients.