A. Berthoz. Brain mechanisms for locomotion and spatial memory during navigation. A multidisciplinary approach (key note). Gerontechnology 2008; 7(2):71. The neural basis of locomotion and spatial memory during navigation often dys-functions with age. We propose that many motor deficits are in part higher cognitive function deficits. **Locomotion** Locomotion is sub-served by a hierarchy of mechanisms, pattern generators in the spinal cord, control of mesencephalic and basal ganglia centers responsible for the initiation of gait, and changes in locomotor synergies. In the adult, locomotion is controlled top-down from the head. The head is stabilized and serves as an inertial guiding platform[1,2] and the vestibular system, together with gaze, plays a fundamental role in this control which also coordinates equilibrium and anticipatory goal oriented movements. During aging, pathology of the vestibular system has a crucial role in the disorganisation of locomotion, as has the generation of locomotor trajectories[3-6]. The neural organisation of a locomotor path to navigate in the environment implies areas in the brain involved in spatial orientation, such as the the parietal cortex, the hippocampus etc. The capacity to generate a locomotor trajectory requires that several systems in the brain are operating together. Cooperation with roboticians enriches our neuroscience approach of these problems. **Navigation and spatial memory** Disorders in spatial memory, navigation, and manipulation of reference frames are often observed during aging, e.g. in Alzheimer disease, agoraphobia or spatial anxiety disorders. It may induce falls. When navigating, or trying to remember a traveled path, the brain uses different cognitive strategies: (i) an egocentric(topo-kinesthetic), memory of the travel involving kinaesthetic memories of the route and episodic memory, or (ii) allocentric (topo-graphic) memories[7-11]. Different brain systems are involved in these two strategies and they develop during ontogeny. I will describe fMRI studies and intracranial recordings in epileptic patients which identify the brain areas involved in these strategies and also in perspective taking[12]. During aging the allocentric strategy tends to be impaired and the old person uses, like the child, more the egocentric strategy. Gender differences also have to be taken into account[13]. Virtual reality allows us to selectively identify the areas involved in such tasks as perspective change, manipulation of reference frames, decision making[14,15]. Virtual reality and robotic devices can also be used to remediate the deficits, opening up a new field in which neuroscientists, neurologists, psychiatrists, otolaryngologists and roboticians cooperate to compensate deficits related to aging.

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