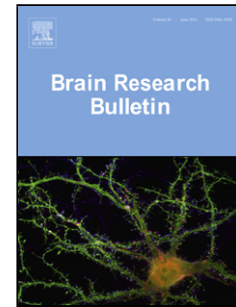


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## Walking and non-walking space in an equivalent virtual reality task: sexual dimorphism and aging decline of spatial abilities

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### Highlights

- Aging affects orientation skills equally in both walking and non-walking spatial memory tasks.
- Spatial memory in the non-walking space demands more cognitive effort.
- Men outperformed women under high difficulty conditions.
- 70-79 year-old groups were impaired in comparison to the other groups in both tasks.

### Abstract

Spatial memory enables us to locate places and objects in space, to determine our position and manage spatial relationships in our environment. Our operations are displayed in a space that sometimes is inaccessible. In this case, the impossibility of movement within the context forces individuals to rely on the information gathered from limited viewpoints. This study investigates the use of walking and non-walking spaces using two equivalent virtual reality tasks in which displacement is only permitted in one of them. One hundred and fifty participants were divided into three age groups: 50-59, 60-69 and 70-79 year-old subjects. The starting position changed pseudo-randomly and two difficulty levels were set, with one and three positions to be found. Results provided evidence for 70-79 year-old people impairment of their spatial abilities compared with 50-59 and 60-69 year-old groups. In both difficulty conditions, participants made more errors in the non-walking space than in the walking space. All participants showed an improvement in the last trials of the task. Moreover, sexual dimorphism was registered in the high level of difficulty, in which men outperformed women. This study supports the idea that aging impairs the organization of spatial representations of the environment, and that this aspect is more noticeable in conditions where displacement is limited.

**Keywords:** elderly; reference frame; spatial memory; spatial orientation.

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