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# Influence of bilateral vestibulopathy on self-location and body ownership measured by multisensory illusion in virtual reality

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## Abstract

Studying behaviour and perception in patients with a bilateral vestibulopathy is essential to understand the vestibular contributions to space, self and body representations. Here, we compared the experience of self-location and self-identification in a virtual environment and experience of depersonalization in 29 patients with a bilateral vestibulopathy and 29 healthy volunteers matched for age and sex. We used a full-body illusion based on synchronous visuo-tactile stimulation in an immersive virtual environment. A tactile stimulation was applied to the participant's back and reproduced in synchronous or asynchronous (with a delay of 1s) manner on the avatar's back which was situated 2 metres in front of the participant in a virtual environment. In the control group, our preliminary analysis showed a statistically significant larger self-relocation toward the avatar after synchronous visuo-tactile stimulation when compared to asynchronous stimulation, in accordance with previous studies (Lenggenhager et al., 2007; Nakul et al., 2020). However, there was no significant difference in the perceived self-location between synchronous and asynchronous stimulation in patients with bilateral vestibulopathy. These results suggest different multisensory mechanisms for encoding self-location in patients with bilateral vestibulopathy. Moreover, depersonalization scores did not differ significantly between both groups of participants, suggesting that a bilateral vestibulopathy doesn't modify the experience of a bodily self as measured with questionnaires, or affects it less than in patients with unilateral vestibular disorders (Lopez & Elzière, 2018).

**Keywords:** self, location, bilateral vestibulopathy, bodily self

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