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Investigating the neural processing of active self-motion – First insights from a pilot study

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Background

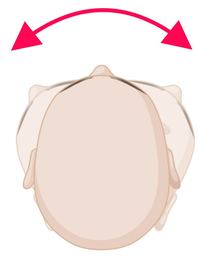
The neural underpinnings of how the brain processes natural self-motion in humans remains unclear. Self-motion is movement which can either be voluntarily generated, i.e. *active,* or externally generated, i.e. *passive* (1). Despite being a vital function across all species, the research evidence on self-motion is scarce. Past research has highlighted the importance of vestibular signals in the perception and execution of self-motion (1, 2). A recent study on whole-body movements has linked vestibular evoked potentials (VestEPs) to passive self-motion in humans (2).

To probe the neural computation of active self-motion in humans, this pilot study explores VestEPs during active self-motion.

Methods

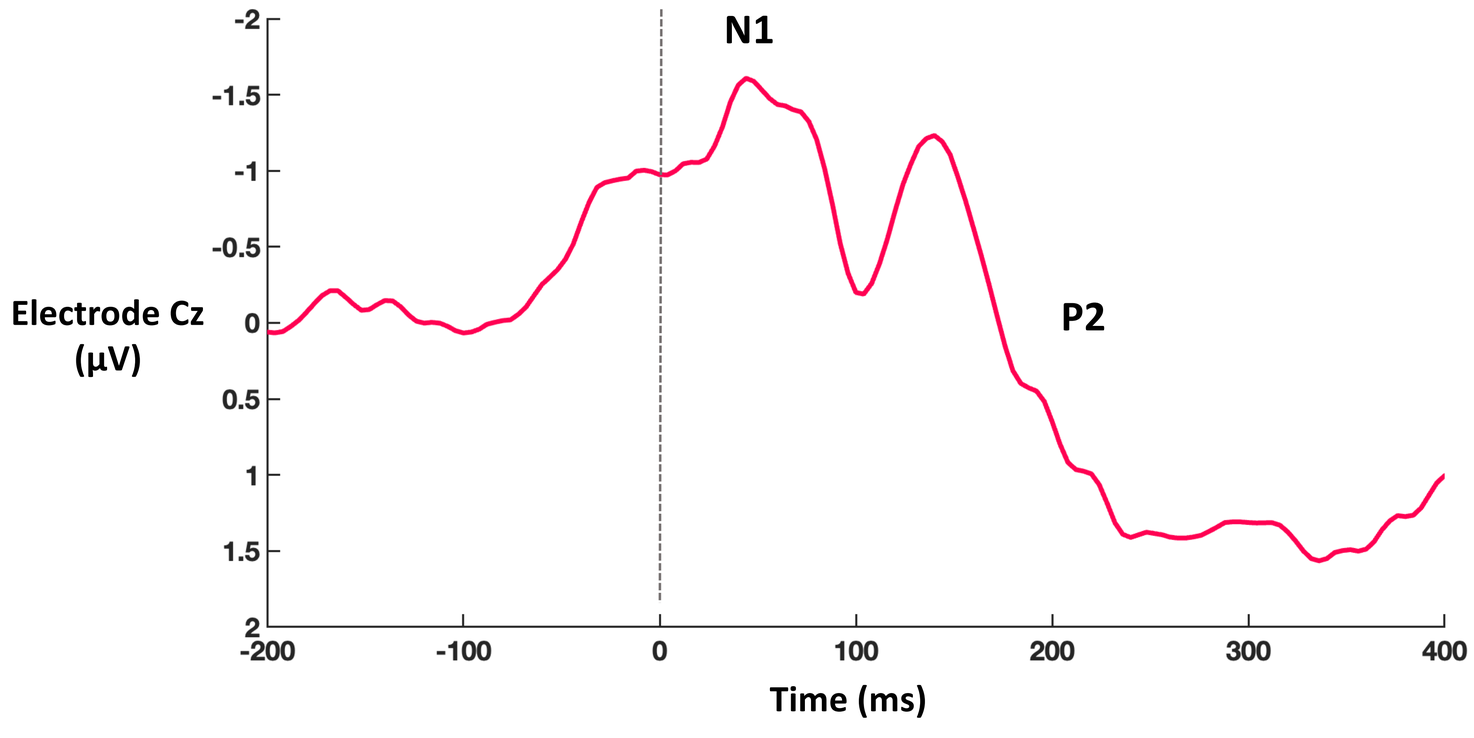
N = 5 (2 females, 3 males), mean age: 27.4 years, (*SD*: 1.5 years)

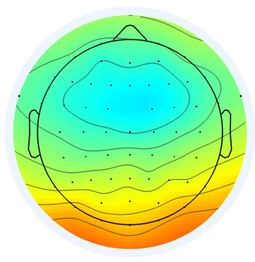
Participants had to rotate their head in the horizontal plane either to their left or right side. Arriving either to the centre, right or left side, they had to wait at least 2 seconds. Simultaneously, their brain activity was recorded with electroencephalography (EEG).

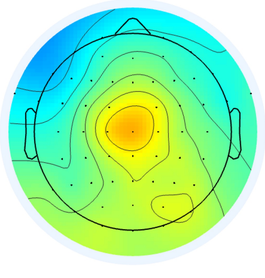


20° (centre-right)
20° (centre-left)

Results







Discussion

This pilot study provided preliminary results on the neural processing of active self-motion in humans. On a descriptive level, the results reveal a N1-P2 complex located over the central electrode *Cz*. Building on previous studies identifying similar VestEPs in passive self-motion (2), these first results establish possible comparability between the cortical processing of active and passive self-motion in humans in an ecologically valid setting. Further investigation will also focus on reafference in the vestibular system, especially during the onset of head rotations in active and passive self-motion.

References

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2. Ertl., M., Moser, M., Boegle, R., Conrad, J., zu Eulenburg, P., & Dieterich, M. (2017). The cortical spatiotemporal correlate of otolith stimulation: Vestibular evoked potentials by body translations. *NeuroImage*, *155*, 50-59. doi:10.1016/j.neuroimage.2017.02.044.

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