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A D V A N C E D S E M I N A R
for
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Comparison of Attractive and Repulsive Vibrotactile Biofeedback for Postural Control During Dual-Tasking

Problem description:

Wearable devices provide a good opportunity for people with postural instability for the application in everyday life [6]. Thereby, vibrotactile biofeedback has the advantage to be unobtrusive [2] and not distract from other tasks [7], and to improve postural control e.g. in patients with vestibular disorders [9]. Commonly, vibrotactile feedback is provided and instructed in a repulsive way, indicating to move away from the stimulus to counteract instable posture in a certain direction, thus move in the opposite direction of the stimulus to maintain stable [8, 3]. On the other hand, it has also been observed that subjects moved in the direction of vibration when no instruction was given [5], and that an attractive stimulus encoding (moving in the same direction of stimulus) resulted in faster reaction times compared to a repulsive encoding during reactive stepping [1]. Previous studies comparing attractive and repulsive stimuli during quiet standing [4, 10], have found both effective in terms of reduced body sway and have found a slight advantage for the repulsive encoding in terms of intuitiveness and ease of learning. However, it remains still unclear, how the two types of stimulus encoding (attractive vs. repulsive) differ in terms of cognitive load [9], which might affect the application of vibrotactile biofeedback for postural control in everyday life.

- Literature research
- Develop study design for dual-tasking
- Conduct pilot study with 5 healthy young subjects
- Conduct user study with 32 healthy older subjects
- (Optional: conduct user study with 5-10 geriatric patients)
- Build vibrotactile belt for follow-up studies
- Compare attractive and repulsive vibrotactile feedback during dual-tasking

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