

SENSORIMOTOR ADAPTATION IN VIRTUAL ENVIRONMENTS: THE CRITICAL ROLE OF INDIVIDUAL COGNITIVE STYLE

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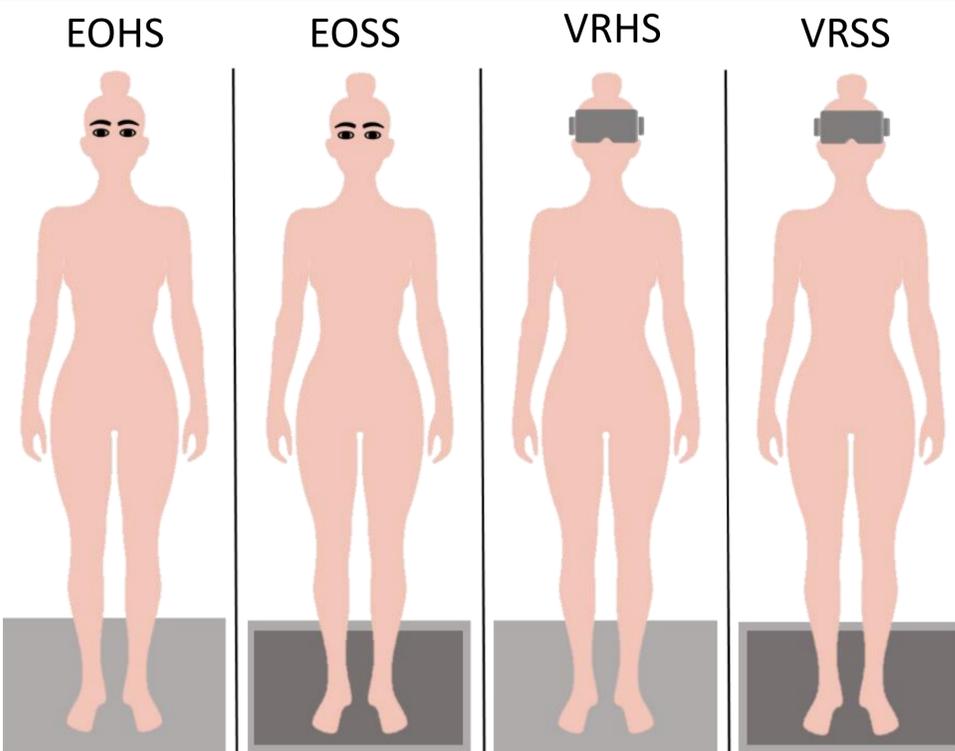
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INTRODUCTION & AIM

- The cognitive style of field-dependence/field-independence (FD/FI) significantly impacts sensory reliance for postural control.
- Field-dependent (FD) individuals rely more on visual cues.
- Field-independent (FI) individuals prioritize vestibular and proprioceptive information.
- This study investigates how FD/FI style affects postural adaptation in complex tasks involving sensory deprivation and virtual reality (VR).

METHOD



- A total of 41 participants aged 19–26 years were classified as either FD or FI based on the Gottschaldt Figures Test..
- Postural stability was measured with the Stabilan-01-2 stabilometry system.
- Testing was performed under five sensory and support conditions: Eyes Open (EO); Eyes Closed (EC); Virtual Reality Goggles (VR); Hard Surface (HS); Soft Surface (SS)

RESULTS & DISCUSSION

All participants exhibited impaired postural stability when performing complex sensory-motor tasks.

Field-Independent (FI) Individuals

- Demonstrated enhanced stability when challenged with either simple visual deprivation or a simple proprioceptive limitation (SS).
- Showed a slower recovery of postural control after the combined, most complex condition (VR on a SS).

Field-Dependent (FD) Individuals

- Experienced significantly increased destabilization specifically in response to VR on a HS.
- Exhibited a prolonged recovery time following periods of simple visual deprivation.
- Demonstrated a faster adaptation rate during the recovery phase after the combined VR and SS.

The **combination of VR and a SS** caused immediate and significant destabilization in both FD and FI groups.

This condition revealed a critical difference in recovery strategy: FI individuals stabilized slowly, while FD individuals adapted more rapidly.

CONCLUSION

- FI individuals utilize more effective strategies in sensory-deprived conditions. However, their strong reliance on internal cues increases their susceptibility to the combined effects of VR and proprioceptive deficits.
- It is crucial to consider a patient's cognitive style (FD/FI) when prescribing VR-based therapy.
- Accounting for this style is critical for minimizing fall risks and optimizing rehabilitation protocols.

FUTURE WORK

To investigate the longitudinal effects of tailored VR therapy on fall risk reduction and functional recovery. To examine the interaction between cognitive style, age, and specific neurological conditions in VR-based therapy outcomes.