MEASURING VISUOSPATIAL ATTENTION IN EXOSKELETON ASSISTED LOCOMOTION: EXPERIMENTAL DESIGN

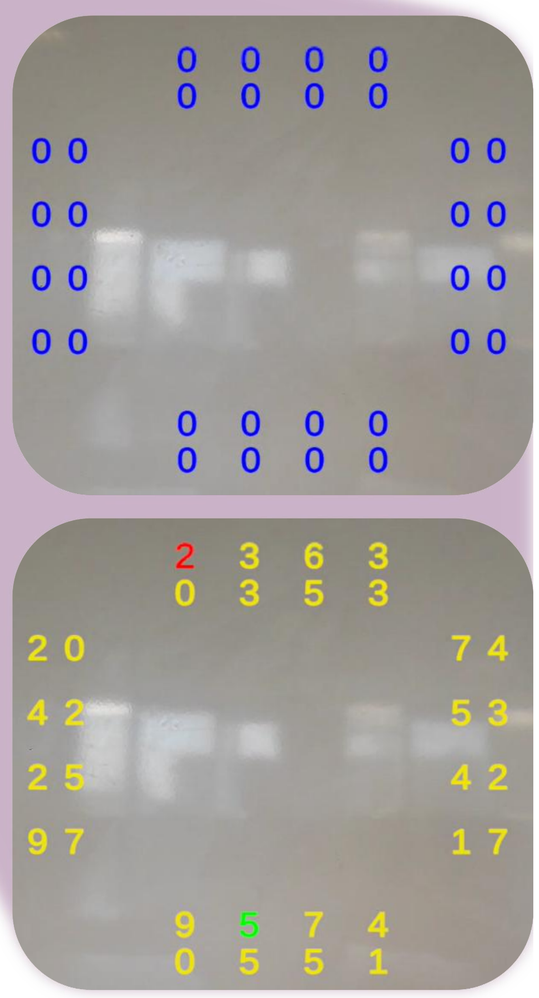
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INTRODUCTION



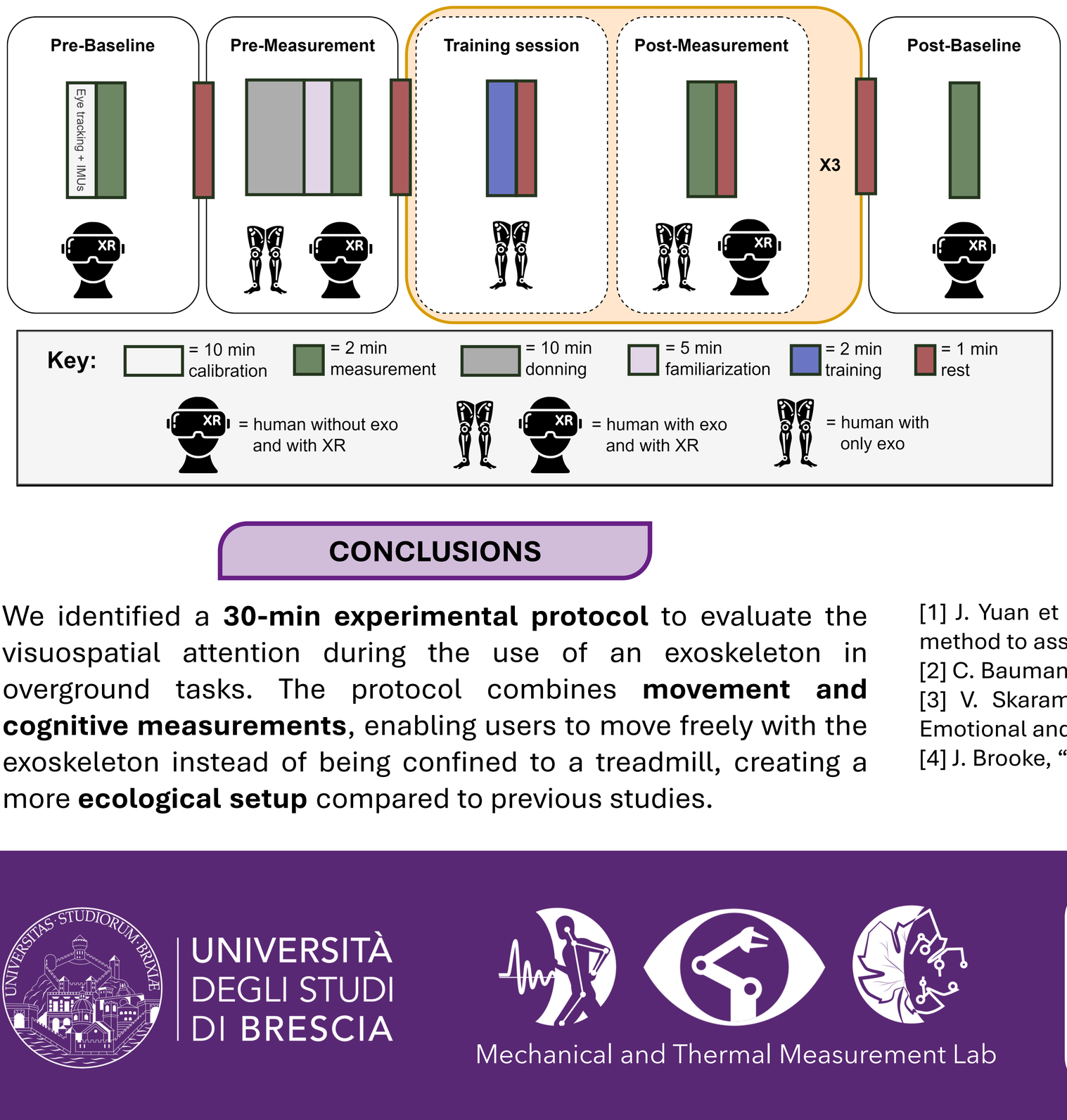
Exoskeleton-assisted walking presents **cognitive and physical challenges** that traditional gait metrics may not fully capture. Visuospatial attention has emerged as a key factor in motor learning [1], while gamified mixed reality environments have shown benefits in rehabilitation. This project aims to develop a **novel system that integrates cognitive** (visuospatial attention) **and motor metrics** within a gamified mixed reality setting to better assess learning during exoskeleton-assisted locomotion.



METHODOLOGY

The **Standing and Walking Visual Attention Field** [1] (SWAVF) task has been redesigned in mixed reality to allow free movement during exoskeleton-assisted walking. Using the **Meta Quest 3**, it presents numbered stimuli across the entire peripheral field, replacing fixed LEDs and static setups. Integrated **eye tracking** (Pupil Neon) [2] and **inertial sensors** (Xsens MTw Awinda) enable the simultaneous collection of **cognitive metrics** [3] such as fixations, saccades, and reaction times and **motor parameters** like step cadence, stride length, and movement smoothness.

RESULTS



Several versions of the procedure were tested with **healthy participants**, whose feedback via the SUS questionnaire [4] helped refine the final protocol, balancing usability, duration, and perceived fatigue. The study design includes a familiarization phase with the exoskeleton, followed by repeated sessions (pre-training, training, and post-training) conducted at **three different experience levels** (beginner, intermediate and advanced). Baseline assessments without the exoskeleton are performed before and after the training phases to establish reference values and control for fatigue effects.

CONCLUSIONS

We identified a **30-min experimental protocol** to evaluate the visuospatial attention during the use of an exoskeleton in overground tasks. The protocol combines **movement and cognitive measurements**, enabling users to move freely with the exoskeleton instead of being confined to a treadmill, creating a more **ecological setup** compared to previous studies.

REFERENCES

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