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Motor adaptation to visual symmetry error augmentation in bimanual forward reaching.

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Motor rehabilitation programs based on low- cost exercise devices such as the Nintendo Wii and Microsoft Kinect have proven efficacy, and with the emergence of commercially available immersive VR technology with motion-tracked controls, further exploration into engagement in exergaming is required. Specifically, for adolescents with neurological motor disorders, finding a balance between engaging activities and effective exercises has not been well explored. The alignment of the weak and strong sides has been previously proven to increase neuroplastic growth via the linking of cerebral hemispheres during symmetric bimanual tasks. The use of head-mounted displays allowing for full occlusion of true visual positioning could be more advantageous for error augmentation and stereoscopic 3D spatial display of symmetric differences. The main purpose of this study is to explore the effect of using immersive VR environments to manipulate visual feedback via error augmentation to encourage more symmetric reaching in hemiparetic persons. Motor adaptation rates will be analysed to evaluate the effectiveness of the visual augmentation of the location of the weaker upper limb.

Using Oculus Rift VR system, motor adaptation to horizontal symmetric error in a forward bimanual reach is used as a starting point to explore possible motor learning opportunities. Discussions on pilot study data collected from healthy participants to evaluate maximum adaptation speeds to asymmetric augmentation is presented. Adolescents and young adults with hemiplegia (i.e. due to ABI, CP, etc.) will be recruited for upcoming studies to conduct testing with a similar single-session setup to validate the system’s effectiveness with the target population.