

Evaluating automated real time feedback and instructions during computerized mirror therapy for upper limb rehabilitation using augmented reflection technology

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ABSTRACT

The use of Virtual and Augmented Reality (VR/AR) in physical rehabilitation can provide better control, improved user motivation, and flexibility in how therapy is offered. Mirror therapy is a therapeutic intervention that has been shown to be beneficial for upper limb stroke rehabilitation. However it requires, in its clinical application, the constant presence and attention of a skilled therapist who provides instructions. This paper presents an AR mirror therapy system that provides automatic instructions and feedback. A within-subjects design user study with healthy volunteers was conducted to evaluate the usability (System Usability Scale), perceived suitability (Suitability Evaluation Questionnaire for Virtual Rehabilitation Systems), satisfaction (subset of Usability Satisfaction Questionnaire), general experience (Mixed Reality Experience Questionnaire) and participants' performance and preference. We compared two conditions where the system automatically instructed the participants and (i) where the system additionally provided feedback, or (ii) the system did not provide feedback. All participants were able to complete the automated mirror therapy intervention. Participants significantly rated the usability and suitability of the automated intervention as positive. The comparisons between the two conditions on *user experience* and *satisfaction* indicated preferences for the feedback condition; however it was not statistically significant. In the direct comparison between systems, participants showed a strong and significant preference for the feedback condition. A few participants reported a mild level of discomfort attributed to the sitting position, exercises and placement of their hands on the table. With this study, further progress towards an automated system for the provision of mirror therapy was achieved and successfully evaluated with healthy participants. Preparations for clinical evaluations using this automated system with patients suffering from motor impairments after stroke can now commence.

Full papers will be published in the Conference Proceedings and will be freely available to delegates at the conference and online on September 20, 2016.