Serious gaming to train pattern-recognition based myoelectric control

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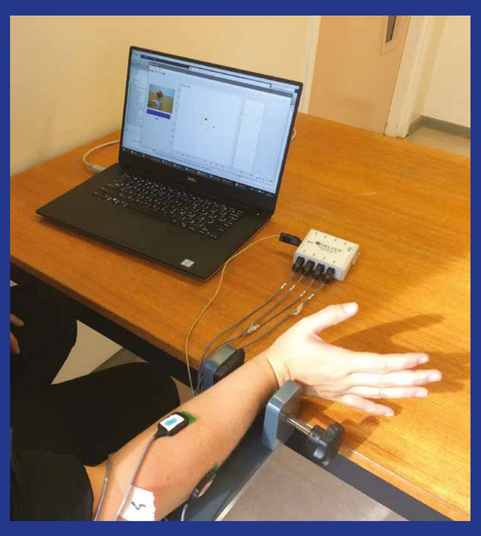
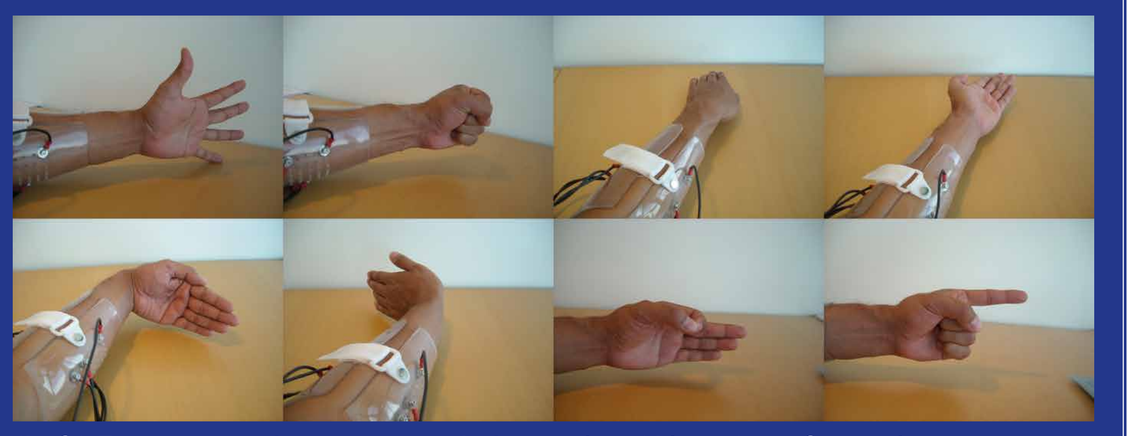
Introduction

User training of upper-limb myoelectric prostheses using a pattern-recognition based control scheme is currently limited to the clinic and consists of a considerable amount of trial and error due to the lack of appropriate feedback. In this study, feedback in the form of a serious game during the system training procedure, is compared to conventional system training. *The objective* of the current study, is to test whether feedback in the form of a serious game gives better results than conventional feedback in the system training of prosthesis control based on pattern recognition.

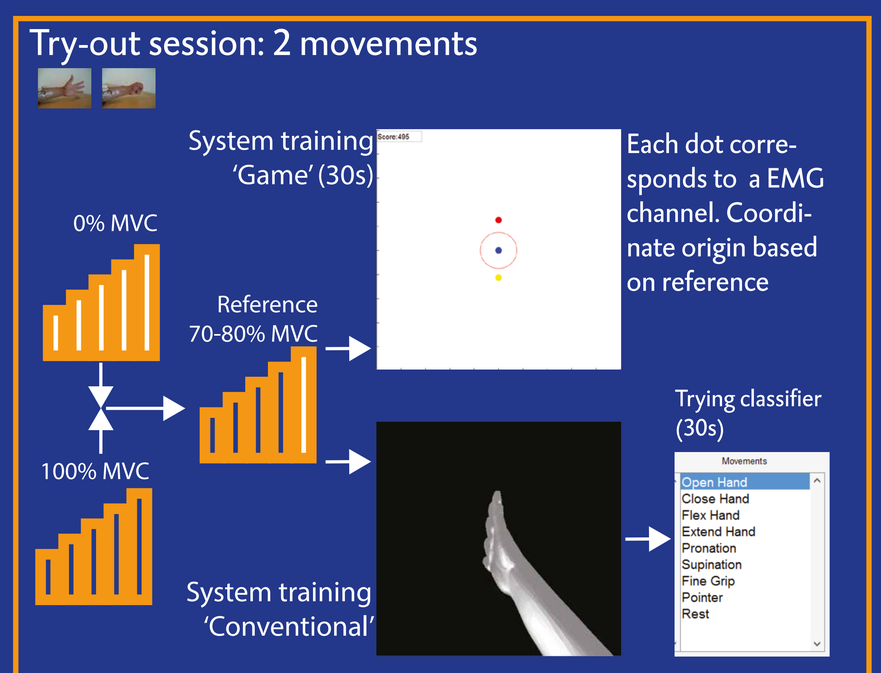
Methods

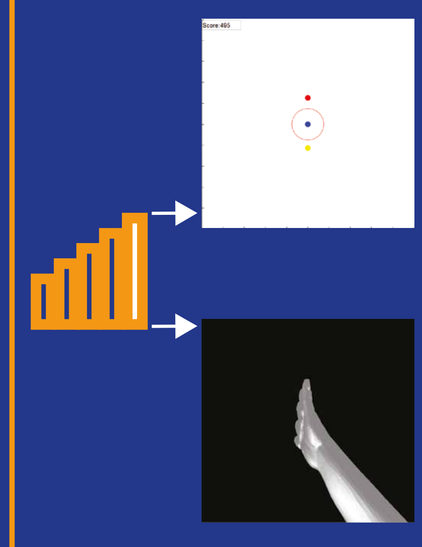
Nine able-bodied volunteers performed the system training in an adapted version of BioPatRec [1]. Performance was evaluated using the motion test [2] and an electronic questionnaire.

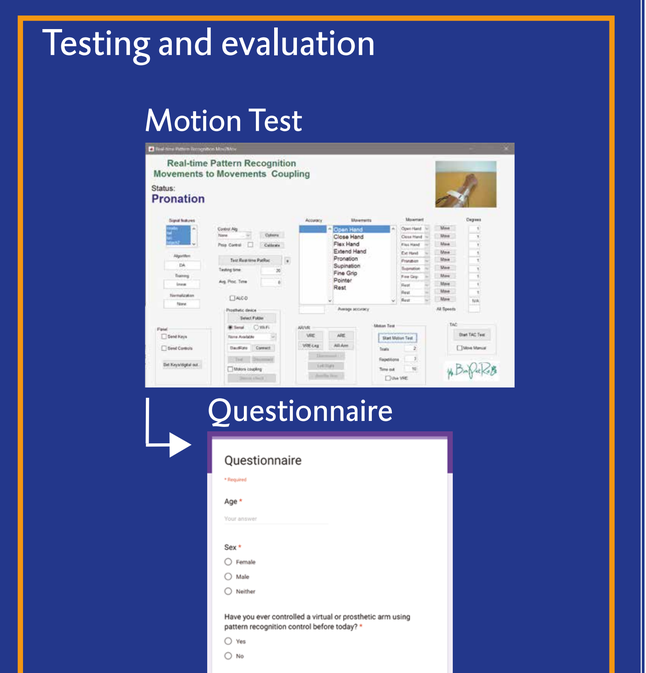




(Left) Experimental setup using 4 electrodes. (Above) performed movements

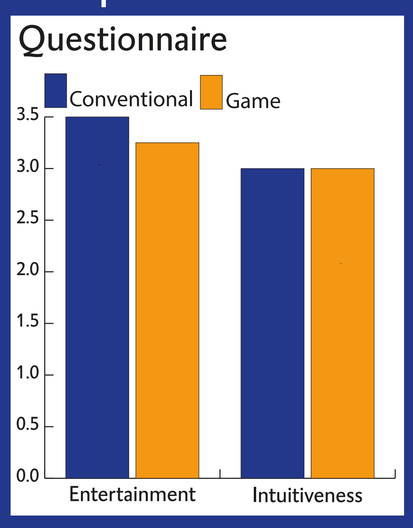


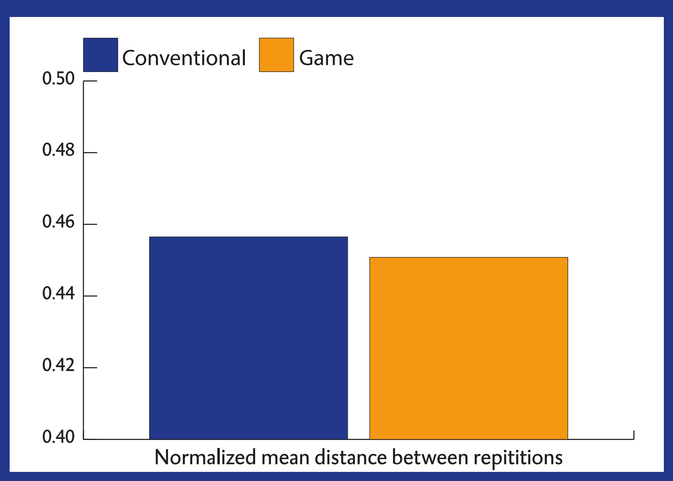


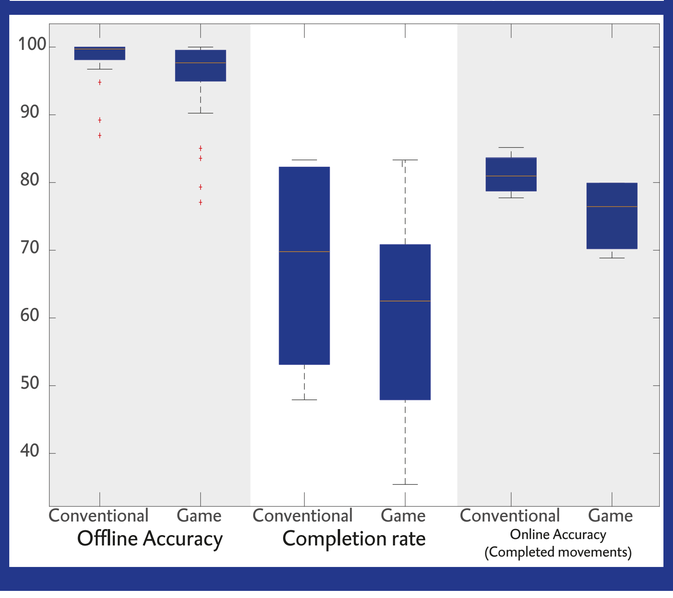


Results

No differences between groups were found between the performance of the motion test and in the questionnaire







Discussion

Reasons that the performance was not different between the two groups:

- The game condition was very dependent on the reference movement. A bad reference resulted in the user striving futilely to match it.
- The mapping between movement and myoelectric output is not intuitive. In the short time-span of system training, the mapping between movement and game control is not established.
- How can the mapping between movement and myoelectric output be established?
- We suggest that the effect of a serious game, which is employed before system training, and also used to train distinct movements, is investigated.

References

[1] Ortiz-Catalan et al. (2013)
[2] Kuiken et al. (2009)

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