Het leren controleren van spiersignalen in de arm

No registrations found.

Ethical review	Not applicable
Status	Recruiting
Health condition type	-
Study type	Interventional

Summary

ID

NL-OMON26803

Source
Nationaal Trial Register

Health condition

Electromyogram (EMG) control, learning, feedback, myocontrol

Sponsors and support

Primary sponsor: University Medical Center Groningen (UMCG)
Source(s) of monetary or material Support: The European Council

Intervention

Outcome measures

Primary outcome

Repeatability Index, Similarity Index, and Mean Semi-Principal Axes. Motion Test outcomes (completion rate, Accuracy)

Secondary outcome

User experience questionnaire

Study description

Background summary

To perform a movement muscles get activated that produce a torque around a joint. As a by-product of this muscle activation an electric current is produced at the muscle (i.e., electromyogram (EMG), also called a myosignal) that can be picked up by surface electrodes. From a motor control perspective the control of myosignals to steer an assistive device or an avatar in a virtual environment represents an intriguing task because a by-product of movement is used in a goal-directed way. Moreover, feedback of myosignal features such as amplitude or frequency is not directly available to human perception and even though muscle force and mechanical joint response are related to those myosignal features, the relation is far from linear or intuitive. Nevertheless, surface EMG (myosignal) control is being employed in several devices, such as upper limb prostheses in which electrodes in the prosthesis socket pick up surface EMG (myosignals) and translate it to active movements of the prosthesis hand and wrist. However, until today the underlying mechanisms of learning a task controlled through myosignals are poorly understood. From a fundamental motor control perspective, the way humans learn to precisely control their myosignals remains unclear when the goal response to their muscle activation is not a physiological one, but instead related to a virtual avatar or an active prosthesis. We compare three training paradigms to find out which is most effective and to test the idea that even in such an abstract learning goal as controlling myosignals, the learning process is highly task specific and humans are able to improve specific parameters in myosignal feature space, if those are fed back to the user. To measure which training paradigm is the most effective participants will perform a myocontrol task using a pattern-recognition control algorithm. When applying a pattern-recognition control algorithm on the myosignal, control becomes more complex and the skill ceiling is very high, which makes it suitable for evaluating training paradigms. The outcome of this study could give a first insight into the dynamics of learning myosignal control. In future work this could help to advise user training for myosignal gaming or the clinical practice in amputee rehabilitation.

Study objective

In learning to control myosignals, groups will improve on the metrics that they receive feedback on. Group PatRec will have little improvement in all metrics. Group PatRecFeedback and group Game will have significant improvements in Repeatability Index, Similarity Index, and Mean Semi-Principal Axes leading to improvements in the Motion Test metrics.

Study design

Pre-test/Post-test design. Measurements at day 1 and day 5.

Intervention

This study consist of 4 groups that receive different kind of training.

A) Pattern-Recognition system training (PatRec)

B) Pattern-Recognition system training with extended feedback (PatRecFeedback)

C) Serious game which trains robust distinct myosignal generation (Game)

D) Sham training (Sham)

Contacts

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Eligibility criteria

Inclusion criteria

Able-bodied participants

Exclusion criteria

Participants with prior experience in myoelectric control based on pattern recognition.
Participants with any neurological diseases and musculoskeletal problems in their arms and trunk.

Study design

Design

Study type: Interventional

Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Single blinded (masking used)
Control:	Active

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	15-02-2017
Enrollment:	64
Type:	Anticipated

Ethics review

Not applicable

Application type:	Not applicable

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
NTR-new	NL6269
NTR-old	NTR6611
Other	Ethische Commissie Bewegingswetenschappen, UMCG, Groningen (ECB) : ECB/2017.01.12_1

Study results