APPENDIX SI. Assessment of mu event-related desynchronization (ERD)

Electroencephalography (EEG) signals were recorded with 22 Ag–AgCl disc electrodes with binaural references according to the International 10–20 system of electrode placement with the average of bilateral earlobe references. Impedance for all channels was maintained below 10 kΩ throughout the experiment. Electromyograms were simultaneously recorded from the bilateral EDC with surface Ag–AgCl disc electrodes to monitor electromyographic (EMG) activities during the imagery task to avoid unexpected muscle contraction. EEG and EMG signals were amplified, digitized with a sampling frequency of 1,000 Hz and bandpass filtered (EEG 0.53–100 Hz, EMG 20–1 kHz) using a commercially available bio-signal recorder (Neurofax EEG-9100, Nihon Kohden Corporation, Japan).

The participants sat in an upright position in an armchair. Their eyes were open, and they were facing the computer monitor that displayed the task. The monitor was placed approximately 50 cm in front of the subject at eye level. One trial started with a 10-s period of relaxation during which the word "Rest" was shown on the monitor. After that, the word "Image" was presented for 5 s, and the participants were asked to imagine extension of their affected fingers. The trial ended when the word "Rest" reappeared. After that, the next trial began. To avoid a learning effect, they were given no feedback regarding EEG changes. One session consisted of 20 trials, and the 2 sessions were performed with approximately 5-min rest periods between each session.

The values of mu ERD on the affected motor area (C3 and FC3, or C4 and FC4) were calculated. The same electrodes used in the BCI training were chosen. Event-related trials lasting 5 s during motor imagery were selected for off-line data processing. All trials were visually assessed. The trials with artefacts resulting from eye movement and the trials with increased EMG activity were excluded. All trials were segmented into successive 1-s windows with 900 overlapping samples, and the Fourier transform with the Hanning window was applied to each segment. The power spectral density of each segment was estimated over the trials using Welch's averaged periodogram method (36). All off-line analysis of EEG data was performed using MATLAB (The MathWorks, Inc., USA).