Title: ACTION OBSERVATION TREATMENT FOR MOTOR REHABILITATION

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Grants:
Progetto di ricerca INAIL-KHARE: Kinect Hololens Assisted Rehabilitation. Terapia riabilitativa basata sull’osservazione dell’azione nel recupero funzionale successivo al trauma. 
PI: Maddalena Fabbri-Destro

Progetto di ricerca INAIL-Move2Work: Terapia riabilitativa del gesto lavorativo basata sull’osservazione dell’azione nel recupero funzionale successivo al trauma.
PI: Pietro Avanzini

PHOENICS: PHysiotherapy and actiOn obsErVatioN therapy: an Integrated approaCh supported by novel technologies, Bando “Health and Wealth” 2015 dell’Università di Brescia
PI: Pietro Avanzini, Maddalena Fabbri-Destro

Mirrorable: a new platform for peer to peer action observation treatment (funded by Fight the Stroke)
PI: Maddalena Fabbri-Destro

Bando per la ricerca Finalizzata 2018 GR-2018-12367117. The upper-limb functional rehabilitation in chronic stroke patients: From neuroimaging and bio-humoral biomarkers of a personalized Action Observation Treatment based on virtual reality to a maximized and predictable rehabilitative outcome.
PI: Pietro Avanzini

Abstract:
Motor rehabilitation represents a fundamental process required by several clinical instances, spanning from traumatology and acute diseases to neurological and chronic conditions. Aside to traditional treatments, including manual therapies, and active movements of the affected body part and execution of functional tasks, the parallel use of neural interventions aimed at keeping trained the whole motor system (including cortical representations) proved efficient in favoring a faster recovery, and a better rehabilitative outcome.

In this framework, we investigate the efficacy and feasibility of the Action Observation Treatment (AOT), i.e. a treatment making the observation and imagery of actions precede their real execution. Action observation and motor imagery, indeed, have proven effective, even in isolation, to induce lasting changes in excitability within M1 cortical representations of muscles/movements involved in observed and executed actions both in healthy individuals and in stroke patients. Their concatenation in a single treatment is thus intended at biasing the motor activation during action execution regardless the peripheral constraints, like for example bandages or restrained motility.

Research is conducted at three different levels: 1) pre-clinical studies are carried out to explore the neural mechanisms underlying AOT efficacy, ultimately sustaining its optimization; 2) clinical trials are conducted on different clinical populations, ranging from neurological conditions like post-stroke patients, neurodegenerative diseases, cerebral palsy to non-neurological conditions like traumatological patients or elderly subjects at risk for falls; 3) clinical studies are conducted to
highlights the neural correlates of AOT efficacy, via neuroimaging (fMRI, DTI, VBM) and clinical scores. In parallel, an effort is made to ground AOT procedures onto the modern technology, embedding AOT into devices administering stimuli in 3D or immersive virtual reality, further enhancing its potential to impact onto the plasticity of the motor system.

**Skills/technology:** neuroimaging; neurorehabilitation; data science; translational neuroscience, virtual reality.

**Selected Publications**


Angelini M, Scalona E, Lopomo NF, Rizzolatti G, Avanzini P. Short-term immobilization reduces the extent of the self-perceived peripersonal space: an immersive virtual reality study. Gait & Posture 74, 1