Study of upper limb force modulation: development of a new device and training protocols for the evaluation of force control in different bimanual configurations.

Casadio Maura
Maura.Casadio@unige.it
Via Opera Pia 13, 16145 Genova (ITALY)
(+39) 010353 - 2749

Sensory deficits are frequent and disabling symptoms in subjects with neuromotor disabilities. These deficits are poorly understood, partly because of the limited sensitivity and reproducibility of conventional clinical measures. In healthy individuals, several studies investigated position sense as well as the ability to produce force and lift weights while the study of production of symmetrical force, particularly functional in the most natural bimanual tasks, has received less attention.

This project aims at developing and testing a new device, methods, and protocols for evaluating symmetries/asymmetries of upper limb force modulation in different loading conditions (same/different arms location). Furthermore, for evaluating the ability of subjects to modulate a specific and bimanual force during the lifting of objects with different weights.

The project will focus on bimanual tasks with the goal of comparing symmetric and asymmetric configurations. We will address the following questions. How is force control affected by variable arm postures? How is symmetrical force control affected by goal-directed task? If possible, this project will define training protocols to enhance the accuracy of position sense and force control.

The student will learn
- to build a set up for functional evaluation that will require different technological solutions to measure sensory abilities or deficits
- to develop data analysis tools for behavioral data
- to improve the knowledge of Matlab and statistical data analysis
- to work in an international team with people with different backgrounds (engineers, physicians, physical therapists) and with people with disability.

DIBRIS department of the University of Genova.

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