Title (tentative): The interaction of position sense and force control: development and testing of new quantitative evaluation methods and training protocols

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Description

Motivation and application domain

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 interactions between position sense and force control, particularly in the most natural bimanual tasks, has received less attention.

General objectives and main activities

This project aims at developing and testing new set-ups, methods, and protocols for evaluating position sense in different loading conditions and for evaluating the ability to produce isometric force with different arm configurations. The project will focus on bimanual tasks with the goal of comparing symmetric and asymmetric configurations. We will address the following questions. How is position sense affected by the exertion of variable isometric forces? How is force control affected by variable arm postures? If possible, this project will investigate the neural correlates of the measured sensory abilities or deficits and will define training protocols to enhance the accuracy of position sense and force control.

Training Objectives (technical/analytical tools, experimental methodologies)

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

Place(s) where the thesis work will be carried out: DIBRIS and DINOGMI department of the University of Genova.

Additional information

Maximum number of students: 1