

# Invitation à la soutenance publique de thèse

Pour l'obtention du grade de Docteur en Sciences de l'Ingénieur

**Madame Patricia LECONTE**

Master ingénieur civil biomédical

## Robotic assessment and rehabilitation of rhythmic upper-limb movement primitives after stroke

After a stroke, two fundamental motor primitives are potentially impaired, i.e. discrete and rhythmic movements. Discrete movements consist of movements between successions of postures while rhythmic movements capture periodic movements. These primitives, which have been thoroughly studied in healthy subjects, are at least partially controlled by different neural pathways. For instance, rhythmic movements require less cortical activity than discrete ones.

In this thesis, both primitives were compared in upper-limb movements of stroke patients. More precisely, our objective was to assess the kinematic performance of both primitives with stroke patients and with healthy subjects as a control group. We unveiled that rhythmic movements are less affected than discrete ones after a stroke, supporting the hypothesis that both movements are governed by different neural pathways.

Consequently, our second objective was to design a purely unilateral rhythmic movement therapy that could complement existing rehab protocols. A robotic rhythmic rehabilitation therapy was designed to achieve a performance-based assistance: the amount of assistance given to the patient was adapted in real-time as a function of his/her performance.

Finally, the last objective of this thesis was to study the effect of this rhythmic training on the general motor performance of a large stroke population. We observed motor improvements both in rhythmic movements, and, more surprisingly, some in specific features of discrete movements. This result opens the door for designing new rhythmic-discrete rehab protocols that might use the least affected primitive to support the recovery of the most affected one.

**Vendredi 20 octobre 2017 à  
16h00**

Auditoire BARB 92  
Place Sainte Barbe, 1  
1348 Louvain-la-Neuve



### Membres du jury :

Prof. Renaud Ronsse (UCL, promoteur)  
Prof. Thomas Pardoën (UCL), président  
Prof. Philippe Lefèvre (UCL), secrétaire  
Prof. Thierry Lejeune (UCL)  
Prof. Heike Vallery (Delft University of Technology, Netherlands)  
Prof. Peter Feys (Universiteit Hasselt, Belgique)