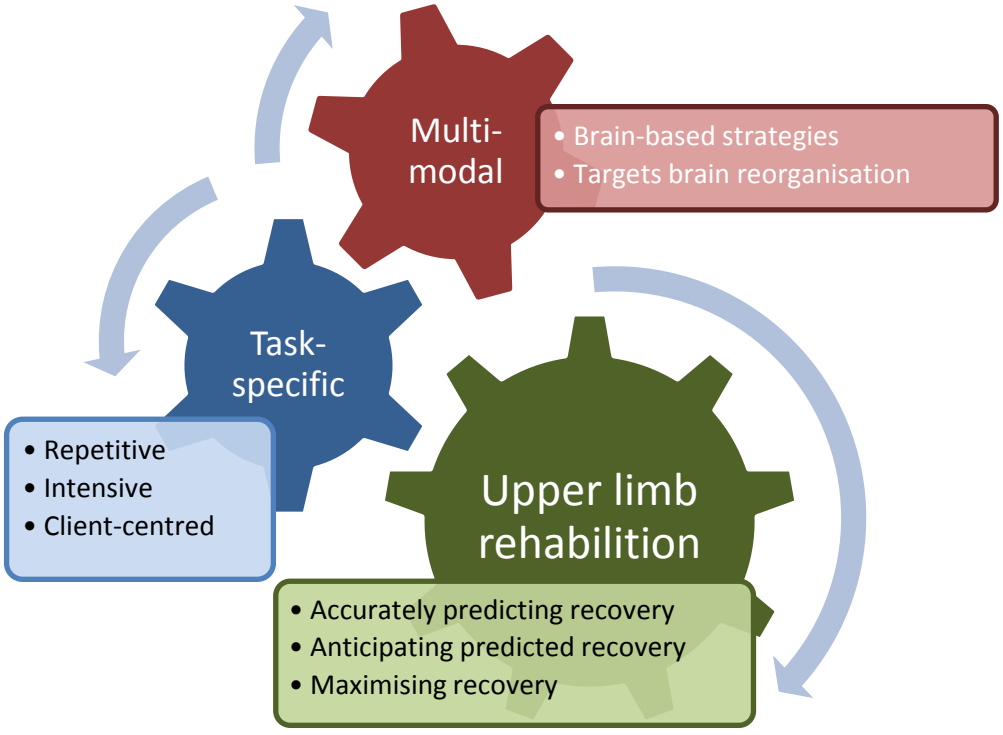
Upper Limb Recovery and Brain Reorganisation Post-stroke



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Statement of originality

The thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to the final version of my thesis being made available worldwide when deposited in the University's Digital Repository**, subject to the provisions of the Copyright Act 1968.
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Synopsis

Stroke represents a disconnection phenomenon that often adversely affects the sensorimotor function of a patient's upper limb (UL). In adults, the brain's natural capacity to reorganise in response to changes in behavioural demands provides a foundation for post-stroke recovery. Evidence indicates that UL recovery can be attenuated by an intensive, task-specific, motor training approach.

A review of the relevant literature found that ipsilesional sensorimotor regions are important to early, UL recovery. Results found that, to date, no studies have investigated the association between brain activation patterns and different intensities of early, UL training. Subsequently, a randomised controlled trial compared outcomes in those who received intensive, task-specific, UL training and those who received standard care, and found that early, intensive training was associated with differences in the cerebellar and anterior cingulate regions, indicating that intensive training may increase the effort and attention required when undertaking tasks. A follow-up study that used cohort methods found that ipsilesional sensorimotor regions are also important to good UL recovery. Involvement of areas such as the inferior parietal lobe suggests that recovery may be improved with a multi-modal approach.

In addition, a comparison of five commonly used stroke recovery assessments, three of which were specific to UL recovery, found that the Nine Hole Peg test and the modified Rankin Scale were the most responsive to change. A published review [1] of the literature reporting a task-specific approach to UL recovery identified practice-ready strategies that could be applied in patients with a stroke-affected UL.

The findings from this thesis suggest that in future, if clinicians are seeking to drive brain-based recovery in patients with a stroke-affected UL, they may need to consider brain-based approaches that complement an intensive, task-specific, motor-training approach.

1. Hubbard, I.J., et al., *Task-specific training: Evidence for and translation to clinical practice.* Occupational Therapy International, 2009. **16**(3-4): p. 175-189.