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Improved treatment for stroke patients within reach

The complex activities that occur in the human body so people can accurately reach towards objects is the subject of a new study which holds promise for improved treatment of stroke patients.

Senior lecturer in the UQ School of Human Movement Studies Dr Tim Carroll has received an $80,000 2009 UQ Foundation Research Excellence Award to conduct the project over the next 12 months.

“I'm interested in the nervous system, and for most of my research career I have been interested in the way the brain coordinates muscles when performing exercise such as weight-lifting,” he said.

“It is clear that exercise can change the organisation of the brain, and a particularly interesting phenomenon occurs when people perform training with only one limb.

“It's a known phenomenon that when exercise increases strength on one side of the body, there can also be substantial improvements with the opposite limb (on the other side of the body) even though it does no direct training.”

Dr Carroll said accurately reaching towards targets presented difficult control problems for the nervous system, due to the complexity of the human body as a mechanical system, and because information had to be integrated in multiple reference frames (for example, eye-based versus limb-based).

“Yet we accomplish reaching tasks effortlessly and with sufficient flexibility so that we can adapt to tasks such as using tools that alter our limb dynamics,” he said.

“This study looks further at what happens in the brain to cause improvements in reaching with one limb when the other limbs learns to move in a new environment such as when holding an unfamiliar tool.

“Discovering the causes of transfer between limbs will advance our basic understanding of motor learning.
“It might also provide a conceptual basis to improve treatment for movement disorders that chiefly affect one side of the body, for example stroke.”

Dr Carroll, who graduated with a Bachelor of Science with first-class honours from UQ in 1996, was awarded a UQ PhD in neuroscience in 2001.

After completing a postdoctoral fellowship at the University of Alberta and being appointed a senior lecturer at the University of New South Wales, he re-joined UQ in 2007. His projects have attracted almost $1 million in competitive research funding since 2004.

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Dr Carroll frequently publishes in top-tier disciplinary publications including the Journal of Physiology, Journal of Applied Physiology and the Journal of Neurophysiology.

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