

Study sheds light on how our brains move limbs

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(Medical Xpress)—A Queen's University study is giving new insight into how the neurons in our brains control our limbs. The research might one day help with the design of more functional artificial limbs.

Provided by Queen's University

"We've taken a step closer to understanding how our arms and legs work and how we move our bodies," says neuroscience researcher Tim Lillicrap, who worked with neuroscience professor Stephen Scott on the study.

The researchers used a novel network model, coupled with a computer biophysics model of a limb, to explain some of the prominent patterns of neural activity seen in the brain during movements.

The findings refine previous notions of how neurons in the primary motor cortex fire and drive muscles. The [primary motor cortex](#) is the region of the brain that sends the largest number of connections to the spinal cord.

When moving an arm or a leg, [nerve impulses](#) are sent along [nerve fibres](#) to control the movement of limbs. Different movements require different patterns of nerve impulses—the relationship between these neural patterns and the resulting movements is poorly understood.

The study demonstrates that the patterns of activity are related to specific details of the limb physics—for example, the patterns of [neural activity](#) are tuned (or optimized) for muscle architecture and limb geometry.

Dr. Lillicrap, who did the study as part of his PhD thesis at Queen's and is now a post-doctoral fellow at Oxford University in England, says better understanding of how the brain controls limbs will help develop [artificial limbs](#) in the future.

The study has been published in the latest issue of the journal *Neuron*.

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