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APT CENTER

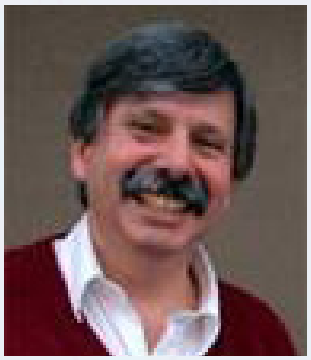
Neural Prosthesis Seminar

"A Dissociating Motor Cortex from the Motor"

November 4, 2011 • 8:30 AM

Location: NORD 310 A&B

Case Western Reserve University



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Abstract:

In understanding how the motor cortex controls the fingers, we tend to make the simplifying assumptions that the functional role of a given cortical neuron and its effect on a particular motoneuron pool both remain relatively constant. If so, then the activity of multiple cortical neurons, each weighted by the strength of its effect on the motoneuron pool, should sum to predict the activity of their common target muscles. Such simple summing of cortical neuron activity, however, accounts for muscle activity only partially.

Could the effect of a given cortical neuron on a particular motoneuron pool be variable? We tested this hypothesis by rewarding monkeys for discharging the same cortical neuron in combination with different target muscles. During intense co-activation of a given cortical neuron with various muscles, the amplitude of spike-triggered average effects between the cortical neuron and any given muscle often varied substantially. In some cases, the pure post-spike effect of a cortico-motoneuronal (CM) cell was clearly present during some epochs, but absent during others. The throughput of CM connections thus appears to be variable.

If a CM cell's effect on muscles is variable, then can the function of cortical neurons vary as well? When neuron firing rates are used for closed-loop control of a brain-machine interface, many neurons change their preferred direction, limb movements diminish, and eventually muscle contractions stop. Cortical neurons then continue to discharge in dissociation from the body movements they previously appeared to control. We therefore are beginning to examine factors that determine whether motor cortex neurons can be combined into small ensembles, dissociated from finger movements, and used to drive a cursor in one-dimension.

For more information, please contact Cathy Naples at (216) 707-6490.

This seminar will not be webcast.

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