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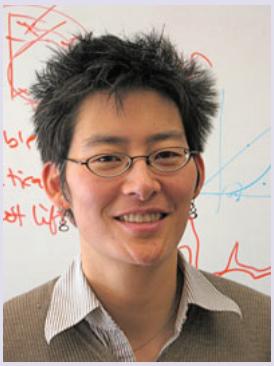
DEPARTMENT OF BIOLOGY
CASE WESTERN RESERVE UNIVERSITY

# Neural Prosthesis Seminar

## Neuromechanical Principles Underlying Sensorimotor Modularity: Implications for Rehabilitation

Friday, December 18, 2015 • 8:30 AM

Biomedical Research Building, Room 105
Case Western Reserve University

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**Abstract**

Neuromechanical principles define the properties and problems that shape neural solutions for movement. Although the theoretical and experimental evidence is debated, I will present arguments for consistent structures in motor patterns, i.e., motor modules, that are neuromechanical solutions for movement that are particular to an individual and shaped by evolutionary, developmental, and learning processes. In particular, I will demonstrate how computational analysis of muscle activity in gait and balance reveal consistent structure in muscle coordination that coordinate muscles to achieve motor goals requiring multi-joint movement. Moreover, both individual differences and trial by trial adaptation of these structures reflect higher, task-level modulation of motor goals. As such, different aspects of the modular structure of neuromotor output may be attributable to neural computations at different levels of the nervous system. Therefore, examining how such modular organization is disrupted in and improved through rehabilitation in spinal cord injury, stroke, and Parkinson's disease may lead to a better understanding of the causal nature of modularity and its underlying neural substrates.


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