

# Engineering Neuroscience & Health

Department of Biomedical Engineering

Division of Biokinesiology and Physical Therapy



ENH SEMINAR SERIES



**Presents:**

**Maurice Smith**

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**Monday**

**March 26, 2012**

**4:00 p.m.**

**Pizza will be served: 3:30– 4 pm**

“Variability, reference frames, and internal competition in motor learning”

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<http://www.seas.harvard.edu/motorlab/>

The ability to control movement is perhaps the central function of the nervous system, and the ability to optimize this control through learning can be absolutely essential for successful movement. The human motor system, in particular, has a remarkable capacity for adaptive control. I will present some recent insights into the mechanisms by which humans achieve this adaptive control during voluntary movement. I will begin by looking at how both inter-individual and task-related differences in learning ability are related to the structure of motor output variability and how the structure of motor output variability can be adaptively reshaped to optimize learning ability. I will then proceed to discuss recent work on the mechanisms for spatial representations in motor learning. We show that multiple coordinate frame representations are formed during spatial learning, and that motor memory is based on a gain-field combination of local action representations in intrinsic and extrinsic coordinate frames. We will then show that two distinct adaptive processes with different spatial generalization patterns, different tuning widths, and different learning rates learn in parallel while competing against one another in adaptive strength.

**Locations:** *Seminar is simultaneously presented*

**UPC: HNB 100 — LIVE**  
**Hedco Neurosciences Building**

UPC Campus Map/Directions:  
<http://www.usc.edu/about/visit/upc/>

**HSC: CHP 147 – Video Conference**  
**Center for the Health Professional**

HSC Campus Map/Directions:  
<http://www.usc.edu/about/visit/hsc/>

**Organized by Professor Francisco Valero-Cuevas** <http://bbdl.usc.edu/ENH>

**Web Cast**

<http://capture.usc.edu/college/Catalog/pages/catalog.aspx?catalogId=946350f1-ca84-40e7-b867-e16adba01e4e>

**Information about all seminars can be found at**  
<http://bbdl.usc.edu/ENH>