Name: Topics in motor learning and motor control

Course Number: 197-2-0024

Structure: Two hours weekly lecture, two points

We will read and criticize influential studies about the neural basis of motor learning and motor control. Topics will include representation of movement in the motor system, the functional role of the motor cortex, the cerebellum, and the basal ganglia in planning, control and learning of movement, adaptation learning, sequence learning, skill learning, vocal learning in the songbird, computational models of motor control.

Week	Subject	Class
1	Introduction to motor system	Intro
2	Research methodologies	
3	Representation of movement – psychophysics	Representation of movement
4	Neural basis of movement	
5	Optimal feedback control	
6	Evolution of plan	
7	Plasticity and motor learning	Learning and plasticity
8	Learning of sequences	
9	Adaptation learning	
10	Motor skill learning	
11	Vocal learning in song birds	Focus on systems
12	Variability in motor learning	
13	Internal models in cerebellum	
14	locomotion	Action observation and imitation
15	Explicit implicit	

Bibliography:

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5. Hikosaka, O., K. Nakamura, K. Sakai, and H. Nakahara, Central mechanisms of motor skill learning. Curr Opin Neurobiol, 2002. 12(2): p. 217-22.
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7. Muller, H. and D. Sternad, Decomposition of variability in the execution of goal-oriented tasks: three components of skill improvement. J Exp Psychol Hum Percept Perform, 2004. 30(1): p. 212-33.

8. Shadmehr, R., Generalization as a behavioral window to the neural mechanisms of learning internal models. Hum Mov Sci, 2004. 23(5): p. 543-68.
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13. Kilgard, M.P., Harnessing plasticity to understand learning and treat disease. Trends Neurosci, 2012. 35(12): p. 715-22.