Credit Assignment, Time-scales, and Basis Elements in Motor Learning [Understanding of the Nitty-Gritty Details of Motor Learning and its Practical Import...]

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If we really understood the algorithms that our nervous systems used to learn motor skills, we might be able to use this knowledge to teach skills more efficiently. This talk will present recent experimental and computational work which aims at this goal. I'll focus on several key details of the motor learning process from our recent work, and attempt to provide a computational framework for a more integrated understanding. These details include (1) The time-scales for the formation and decay of motor memories, and what these timescales tell us about the interactions between the two main learning processes underlying them. (2) How the coordinate system for the assignment of credit and blame for motor errors during learning controls the rate of learning. (3) How coupled representations of position and velocity in the neural coding of motion determine (a) the fine temporal structure of motor adaptation, and (b) the ability of learn arbitrary patterns of dynamics. Recent studies that leverage the basic knowledge gained from this work to design learning paradigms which optimize learning and retention rates for motor skill acquisition will also be presented.