Moving Fast and Slow*: Feedforward and feedback control in insect locomotion

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I will describe mathematical models for running insects, from an energy-conserving biped, through a muscle-actuated hexapod driven by a neural central pattern generator, to reduced phase-oscillator models that capture the dynamics of noisy gaits and external perturbations, and provide estimates of coupling strengths between legs. I will argue that both simple models and large simulations are necessary to understand biological systems, and end by describing some current experiments on fruit flies that cry out for new and improved models.

*Apologies to D. Kahneman "Thinking Fast and Slow"