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Delayed stochastic control TADAAKI HOSAKA, Tokyo Instute of Technology, Japan, TORU OHIRA, Sony Computer Science Labs, Japan, CHRISTIAN LUCIAN, JUAN LUIS CABRERA, Centro de Fisica, Venezuela, JOHN MILTON, The Claremont Colleges, U.S.A. — Time-delayed feedback control becomes problematic in situations in which the time constant of the system is fast compared to the feedback reaction time. In particular, when perturbations are unpredictable, traditional feedback or feed-forward control schemes can be insufficient. Nonethless a human can balance a stick at their fingertip in the presence of fluctuations that occur on time scales shorter than their neural reaction times. Here we study a simple model of a repulsive delayed random walk and demonstrate that the interplay between noise and delay can transiently stabilize an unstable fixed-point. This observation leads to the concept of "delayed stochastic control," i.e. stabilization of tasks, such as stick balancing at the fingertip, by optimally tuning the noise level with respect to the feedback delay time.

References:(1)J.L.Cabrera and J.G.Milton, PRL 89 158702 (2002);(2) T. Ohira and J.G.Milton, PRE 52 3277 (1995);(3)T.Hosaka, T.Ohira, C.Lucian, J.L.Cabrera, and J.G.Milton, Prog. Theor. Phys. (to appear).

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