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Evolving towards the optimal path to extinction in stochastic processes¹ ERIC FORGOSTON, U.S. Naval Research Laboratory, SIMONE BIANCO, LEAH SHAW, College of William and Mary, IRA SCHWARTZ, U.S. Naval Research Laboratory — A large, rare stochastic fluctuation can cause an epidemic or a species to become extinct. In large, finite populations, the extinction process follows an optimal path which maximizes the probability of extinction. We show theoretically that the optimal path also possesses a maximal sensitivity to initial conditions. As a result, the optimal path emerges naturally from the dynamics and may be characterized using the finite-time Lyapunov exponents. Our theory is general, and is demonstrated with several stochastic epidemiological models.

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