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Effect of crosstalk between multiple signaling pathways of a microbial quorum sensing system[1] JOSEPH G. SANDERS, HODA AKL, BINGKAN XUE, STEPHEN J. HAGEN, University of Florida — An ongoing problem in biophysics is how organisms communicate using multiple signals. This has been a subject of much interest in microorganisms that use quorum sensing to regulate essential biological functions. One question that is strange and has not yet been fully explored is how the overall fitness of an organism is affected when pathways that produce and detect multiple quorum signals (autoinducers) are intertwined. As an example, *Vibrio fischeri* uses two major autoinducers (C8HSL and 3OC6HSL) to regulate bioluminescence and other behavioral traits, and the signaling pathways of these autoinducers are known to exhibit significant crosstalk. We study this effect using a simplified model that consists of two signal/receiver pairs, each with its own feedback, and a tunable crosstalk between the two. By analyzing both the steady state and time dependent solutions of the underlying dynamical system we explore the effect of crosstalk on the response range of each signal/receiver, on the steady states that result, and on the trajectories taken from initial to final states. The general formulation of crosstalk in such a model is readily applicable to a variety of crosstalking quorum sensing pathways that regulate important phenotypes in the microbial communities.

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