McCormick

Northwestern Engineering

Engineering Sciences and Applied Mathematics

ESAM Seminar Series Presents:

Why are chemotaxis receptors clustered but other receptors aren't?

Presented by:

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The chemotaxis network of bacteria such as *E. coli* is remarkable for its sensitivity to minute relative changes in chemical concentrations in the environment. Much of this acute sensitivity can be traced to the collective behavior of teams of chemoreceptors on the cell surface. Coupled with a system for adaptation, the advantage for chemotaxis is *gain* – *i.e.*, small relative changes in chemical concentrations are transduced into large relative changes in signaling activity. However, something is troubling about this simple explanation: in addition to providing gain, the coupling of receptors into teams also increases noise, and the net result is a *decrease* in the signal-to-noise ratio of the network. Why then are chemoreceptors observed to form cooperative teams? I will present a novel hypothesis that the run-and-tumble chemotactic strategy of bacteria leads to a "noise threshold", below which noise does not significantly decrease chemotactic velocity, but above which noise dramatically decreases this velocity.

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For further information see http://www.esam.northwestern.edu

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