

Mathematical Modeling of Circadian Clocks and Binocular Rivalry

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Abstract

Rhythms can be found nearly everywhere in biology and are fundamental to brain function. In this talk I will discuss two examples of biological oscillations that operate on very different time scales: daily (circadian) rhythms such as the human sleep/wake cycle, and the alternations in visual perception that occur every few seconds when the two eyes are presented with dissimilar images (binocular rivalry). For each of these phenomena, I will describe how mathematical modeling and dynamical systems theory can be used to make experimentally testable predictions.

Presenter Bio:

Casey is an assistant professor in the Department of Mathematical Sciences at NJIT and a member of the graduate faculty in the Federated Department of Biological Sciences at NJIT and Rutgers-Newark. In his research he uses a combination of mathematical modeling, numerical simulation, and dynamical systems analysis to gain insight into biological systems. He is currently focused on creating a mathematical framework to understand how dynamic changes in gene expression affect the electrical properties of neurons and ultimately animal behavior. Prior to joining NJIT, Casey was a postdoctoral fellow at the Mathematical Biosciences Institute at The Ohio State University. He obtained his Ph.D. from the University of Michigan in 2010.

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