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# Tutorial: What? Why? How? An Introduction to Modeling Biological Systems

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Mathematical modeling has great potential in biological systems analysis because, in contrast to the unaided human mind, mathematics has no problems keeping track of hundreds of interacting variables that affect each other in intricate ways. The scalability of mathematical models, together with their ability to represent essentially arbitrarily complex responses, allows us to explore the dynamics of realistic biological systems, to study what happens if a gene, protein, metabolite, cell, or organism is altered, and to optimize biological systems, for instance, toward the goal of increased yield of some desired organic compound. Before we can utilize models for such purposes, we must design and test them. In this tutorial, I will demonstrate the generic modeling steps of (1) model choice, (2) model design, (3) model diagnostics, and (4) model use, and illustrate them with simple and moderately complex examples. While the tutorial is quite general, special emphasis will be given to power-law modeling within Biochemical Systems Theory (BST).

References:

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