Unsurprisingly, theorists in the field of evolutionary computation often disagree about what tools are most effective for analyzing randomized heuristic search algorithms. Two groups often at odds are those that employ traditional run-time analytical methods and those that use a variety of techniques (e.g., dynamical systems) to analyze abstract models of evolutionary algorithms (EAs). But these tools are not mutually exclusive -- rather, they can complement one another by answering different kinds of questions about the algorithms under consideration.

In this talk, I demonstrate a multilateral theoretical approach by showing how applying both randomized algorithm run-time analysis and dynamical systems analysis of algorithmic models provide a clearer picture of compositional coevolutionary algorithms, a particular class of EAs. Practical aspects of algorithmic design choices will be addressed. Additionally, I will discuss the effects of problem properties (e.g., separability) on optimization performance. The lion’s share of the discussion focuses on the pedagogical point that multilateral analysis can provide deeper insight, rather than on the technical details of the analytical techniques themselves. For the most part, the analyses I discuss in this talk will be confined to undergraduate level mathematics.