# Studying Dynamics in a Multi-Species System Using the Lotka-Volterra Model

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The Lotka–Volterra model (Predator–Prey Model) is a fundamental tool used in ecology and biophysics to describe interactions between species and was originally developed to model predator-prey dynamics.

The classical model describes the interdependence between a single predator and a single prey. In our work, we examine a three-dimensional generalized Lotka–Volterra model, which involves two predators and one prey. This modification allows us to observe the system's transition from stable behavior to chaotic dynamics. We obtained a new set of three equations, and numerical analysis confirmed the presence of chaos. This suggests that, in conflict models, increasing the number of interacting participants leads the system into an unpredictable, chaotic stage.

Finally, the model demonstrates that instability naturally arises in systems with more than three interacting components. This model is not limited to biological population modeling alone; it is widely applied in various fields such as economics (e.g., stock price dynamics), politics (e.g., modeling interactions or armed conflict between three countries), and more.

**References:**

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