Project Summary

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Long-term memory storage in the brain is believed to be effected by persistent changes in the biochemistry within neurons. A class of enzymes, the kinases, have been proposed to be involved in mechanisms underlying memory storage. The characteristic property of a kinase is its ability to phosphorylate a given substrate, often another kinase molecule. Certain enzymes, including the kinases themselves, can exist in a phosphorylated or unphosphorylated state, corresponding to an active or inactive state. It is thought that lasting modifications of the phosphorylation states of kinases are responsible for long-term memory storage.

Based on existing work with single-kinase models, the aim of the project is to model multiple-kinase networks and study their dynamic behavior, particularly the number of potential steady states. Various numbers and connectivities of kinases will be modeled, with kinase-kinase interactions based on Michaelis-Menten kinetics. The effect of network topology on memory storage will be examined.